Richard Borden's
Book
7br 22 1719

THE
Mariners Compaſs
RECTIFIED.

1837
1719
118

1762
1719
43

BOOKS *of Navigation Printed for* Richard Mount.

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Imperfect: — pp. 147-157 + all after 251 are missing

Samuel Borden's Book. AD. 1790.

THE
Mariners Compaſs
RECTIFIED:

Containing TABLES, ſhewing the true Hour of the Day, the Sun being upon any Point of the Compaſs: The Time of the *Riſing* and *Setting* of the *Sun* and *Stars*, and the Points of the *Compaſs* that the *Sun* and *Stars* riſe and ſet with: And Tables of *Amplitude*: With a Table of the *Latitude* and *Longitude* of Places. Calculated from the *Equinoctial*, to 60 deg. of Latitude, &c.

Alſo a Deſcription and Uſe of thoſe Inſtruments moſt in Uſe in the Art of *Navigation*.

By Andrew Wakely, *Math.*

Carefully Corrected, and very much Enlarged, with many Uſeful Additions.

James

By *Ja. Atkinſon*, Teacher of the Mathematicks.

LONDON;
Printed for *Rich. Mount*, in *Poſtern-Row*, on *Tower-Hill*.
Where you may have all Sorts of Sea-Books. 1716.

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To

To the READER.

Courteous Reader,

WHEN I firſt entred upon theſe my Labours and after I had begun the Calculation; I found, that tho' the Book be ſmall, yet my Labour was ſo great that I almoſt fainted. Yet at length, when I conſidered the ordinary, neceſſary, and frequent Uſe that might be made of theſe my Labours, I was thereby encouraged to go on and proſecute my Work; and how ready and eaſie I have made it for actual Performance, will plainly appear, by immediate inſpection, to the meaneſt Capacity.

Here follows a breif Explanation of the Method and Order of the Book. Firſt, You will find Tables of the Sun's Declination, newly Calculated from the beſt Hypotheſis yet diſcovered, and applied to the Meridian of London, *whoſe Latitude is* 51d. 32m. *and Longitude according to my Table* 0d. 0m. *Next you will find Tables ſhewing the true Hour and Minute of the Day, the Sun being upon any Point of the Compaſs; which Tables are as Dials, fitting all Places in the World, whoſe Pole is Elevated, not above* 60d. *either North or South. Likewiſe by theſe Tables you may know the true Hour and Minute of the Night, by the bearing of any of the known fixed Stars between the Tropicks. Then you will find Tables ſhewing the true Time of the Sun's Riſing and Setting, with the Length of the Day and Night. Alſo by theſe Tables you may find the true Time of Riſing and Setting of all the eminent fixed Stars between the*

Tropicks. Next you will find Tables ſhewing the Points of the Compaſs that the Sun and all the aboveſaid Stars riſe and ſet with; which Tables are of excellent uſe for the ready finding of the Variation of the Compaſs, and may be performed by a Meridian-Compaſs that is about ten Inches in Diameter, whoſe Points being divided into halfs and quarters; ſuch a Compaſs I ſuppoſe to be convenient for the Mariners Uſe, where he hath not an Azimuth Compaſs. Next you will find Tables of Amplitudes to every Degree of the Sun's Declination. All theſe Tables are Calculated from the Equinoctial to ſixty Degrees of Latitude, either North or South, and they will laſt with Exactneſs as long as God upholdeth the Order and Courſe of Nature.

In the Appendix *you will find the uſe of all thoſe Inſtruments that are moſt in uſe in the Art of Navigation, either for Operation or Obſervation. Likewiſe a Table conaining the moſt and chiefeſt Harbours, Headlands and Iſlands in the World, ſhewing the* Latitude *and* Longitude *of each of them, beginning the Longitude at the Meridian of* London, *newly Compoſed in a new ſucceſſive Order.*

This Method I own, but how I have acquitted my ſelf therein I ſhall leave to the Judgments and Experiments of the skilfulleſt Mariners that the World affords, which are my native Countrymen of England.

Fare ever well, ſo wiſhes he,
Who is more yours than he can ſeem to be.

Andrew Wakely.

The

The Corrector *to the* Reader.

Candid Reader,

BEING deſired by the Bookſeller concern'd herein, I willingly undertook the Viewing and Correcting this Treatiſe, and the rather for that Reſpect I bear to the Memory of my Maſter, the Deceaſed Author) which for its Uſefulneſs hath obtained good Eſteem with our Navigators: I therefore have took the greater Pains, ſpent much Time in examining each Table, correcting, mending, altering, explaining, and enlarging where I ſaw cauſe: having endeavoured to render the whole of the *Mariners* Compaſs *Rectified* moſt familiar and eaſie to an ordinary Capacity.

In this Edition I have contracted the *Tables of Amplitudes in Points of the Compaſs*, and yet as intelligible as before; by which having made more Room, I have made the Reader amends with large Additions in the Uſe of each Table, and methodizing the Diſcourſe throughout: But moſt eſpecially in the Uſe of Inſtruments; I have taken Liberty to Repair, Alter, and Enlarge, that it will appear as good as new; but chiefly in the *Deſcription and Uſe of the Gunter, Sliding-Gunter, and Sector*: Principally the two former; whoſe Uſes I have ſhewed in *Arithmetick*, to *Multiply*, *Divide*, and work the *Rule of Three*; in *Geometry*, to work *Proportions*, *Continual*, *Duplicate* or *Triplicate*;

Menſuration of *Superficies*, and *Solids*; as to meaſure *Boards*, *Timber*, *Stone*, *Gauging of Veſſels*, and *Tunnageing of Ships*, *Bales* or *Boxes*: Alſo in *Gunnery*. And in *Navigation*, both in *Plain* and *Mercators Sailing*: In *Aſtronomy*, in the moſt uſeful Problems; as to find the *Sun*'s Place, Declination, Riſing, Setting, Amplitude, Azimuth, Hour, and Altitude at all times. And in all, you are directed plainly to perform them, both by Sliding-Gunter, and with Compaſſes.

In the *Table of Latitude and Longitude* I have added many Places of Note, and omitted ſome few that were of little Moment, and have corrected both the Latitudes and Longitudes of the moſt Eminent, according to the lateſt Obſervations: So that I am bold to ſay it's the moſt exact Table of it's kind extant.

Theſe with many other *Additions*, through the whole, I hope will find acceptance with *young Students* in the *Mathematicks*, and prove ſerviceable to them both in their *Studies*, and *Practice* of *Navigation*, and other Parts of the *Mathematicks*; for whoſe ſakes I took the greater Pains herein, who am an obliged Servant to teach them what may here be wanting,

8th *Sept.*
1693.

James Atkinſon.

EXACT

EXACT
TABLES
Of the SUN's
DECLINATION:

Calculated from the beſt *Hypotheſis* yet Diſcovered, and applied to the *Meridian* of *LONDON*,

			D.	M.
Whoſe	Latitude	is	51 :	32
	Longitude		00 :	00

Bowden

Firſt Year after Leap-Year.

Sun's Declination, 1713. 1717. 1721. 1725.

Days.	*Janua.*		*Febr.*		*March.*		*April.*		*May.*		*June.*	
	South.		South.		South.		North.		North.		North.	
1	21	39	13	39	03	17	08	43	18	09	23	11
2	21	28	13	19	02	53	09	05	18	24	23	15
3	21	18	12	59	02	29	09	26	18	39	23	18
4	21	07	12	38	02	05	09	47	18	53	23	21
5	20	56	12	17	01	42	10	09	19	07	23	23
6	20	44	11	56	01	18	10	30	19	21	23	25
7	20	32	11	35	00	54	10	51	19	34	23	27
8	20	19	11	14	00	31	11	12	19	47	23	28
9	20	06	10	53	00	07	11	32	20	00	23	29
10	19	53	10	31	Nor.	16	11	53	20	12	23	29
11	19	38	10	09	00	40	12	13	20	25	23	29
12	19	25	09	47	01	04	12	33	20	36	23	29
13	19	11	09	25	01	27	12	53	20	48	23	28
14	18	56	09	03	01	51	13	13	20	59	23	27
15	18	41	08	40	02	14	13	32	21	09	03	25
16	18	26	08	18	02	38	13	51	21	19	23	23
17	18	10	07	55	03	01	14	10	21	29	23	20
18	17	54	07	32	03	25	14	29	21	39	23	17
19	17	38	07	10	03	48	14	47	21	48	23	14
20	17	21	06	47	04	11	15	06	21	57	23	10
21	17	04	06	24	04	34	15	24	22	05	23	06
22	16	47	06	01	04	57	15	42	22	13	23	01
23	16	29	05	37	05	20	15	59	22	21	22	56
24	16	12	05	14	05	43	16	16	22	28	22	51
25	15	53	04	51	06	06	16	33	22	35	22	45
26	15	35	04	27	06	29	16	50	22	41	22	39
27	15	16	04	04	06	51	17	06	22	47	22	32
28	14	57	03	40	07	14	17	23	22	53	22	25
29	14	38			07	36	17	38	22	58	22	18
30	14	19			07	58	17	54	23	03	22	10
31	13	59			08	21			23	07		

The Firſt Year after Leap-Year.

Sun's Declination 1713. 1717. 1721. 1725.

Days.	*July.*		*Auguſt*		*Septem.*		*October.*		*Novem.*		*Decem.*	
	North.		North.		North.		South.		South.		South.	
1	22	02	15	02	04	12	07	25	17	46	23	08
2	21	53	14	44	03	49	07	48	18	02	23	12
3	21	44	14	25	03	26	08	10	18	18	23	16
4	21	35	14	07	03	03	08	33	18	33	23	20
5	21	25	13	48	02	40	08	55	18	48	23	22
6	21	15	13	29	02	16	09	17	19	03	23	24
7	20	05	13	09	01	53	09	39	19	18	23	26
8	20	54	12	50	01	30	10	01	19	32	23	28
9	20	43	12	30	01	06	10	23	19	46	23	29
10	20	33	12	10	00	43	10	44	19	59	23	29
11	20	20	11	50	00	19	11	06	20	12	23	29
12	20	08	11	30	Sou.	04	11	27	20	25	23	29
13	19	56	11	09	00	27	11	48	20	37	23	27
14	19	44	10	48	00	51	12	09	20	49	23	26
15	19	30	10	28	01	14	12	29	21	01	23	24
16	19	17	10	17	01	38	12	50	21	12	23	22
17	19	04	09	43	02	01	13	10	21	22	23	19
18	18	49	09	24	02	25	13	30	21	33	23	16
19	18	34	09	03	02	48	13	40	21	43	23	12
20	18	20	08	41	03	12	14	10	21	52	23	08
21	18	05	08	19	03	36	14	29	22	01	23	03
22	17	50	07	57	03	58	14	48	22	10	22	58
23	17	34	07	35	04	22	15	07	22	18	22	52
24	17	18	07	13	04	45	15	26	22	26	22	46
25	17	02	06	51	05	08	15	44	22	34	22	39
26	16	46	06	28	05	31	16	03	22	41	22	32
27	16	29	06	06	05	54	16	20	22	47	22	25
28	16	12	05	43	06	17	16	38	22	53	22	17
29	15	55	05	21	06	40	16	55	22	58	22	09
30	15	38	04	58	07	03	17	13	23	03	22	02
31	15	20	04	35			17	29			21	51

Second Year after Leap-Year.

Sun's Declination, 1714. 1718. 1722. 1726.

Days.	*Janua.* South.		*Febr.* South.		*March.* South.		*April.* North.		*May.* North.		*June.* North.	
1	21	41	13	44	03	22	08	37	18	06	23	10
2	21	31	13	24	02	59	08	59	18	21	23	14
3	21	21	13	04	02	35	09	21	18	35	23	17
4	21	10	12	43	02	11	09	42	18	50	23	20
5	20	59	12	22	01	48	10	03	19	04	23	23
6	20	47	12	01	01	24	10	25	19	18	23	25
7	20	35	11	40	01	00	10	46	19	31	23	26
8	20	22	11	19	00	37	11	07	19	44	23	28
9	20	10	10	58	00	13	11	27	19	57	23	29
10	19	56	10	36	Nor.	10	11	48	20	10	23	29
11	19	43	10	14	00	34	12	08	20	22	23	29
12	19	29	09	52	00	58	12	28	20	33	23	29
13	19	15	09	30	01	21	12	48	20	45	23	28
14	19	00	09	08	01	45	13	08	20	56	23	27
15	18	45	08	46	02	08	13	27	21	07	23	25
16	18	30	08	23	02	32	13	47	21	17	23	23
17	18	24	08	01	02	55	14	06	21	27	23	21
18	17	58	07	38	03	18	14	24	21	36	23	18
19	17	42	07	15	03	42	14	43	21	45	23	14
20	17	25	06	52	04	05	15	01	21	54	23	11
21	17	08	06	29	04	29	15	19	22	03	23	07
22	16	51	06	06	04	52	15	37	22	11	23	02
23	16	34	05	43	05	15	15	55	22	19	22	57
24	16	16	05	20	05	38	16	12	22	26	22	52
25	15	58	04	57	06	01	16	19	22	33	22	46
26	15	39	04	33	06	23	16	46	22	40	22	40
27	15	21	04	09	06	46	17	02	22	46	22	34
28	15	02	03	46	07	08	17	19	22	51	22	27
29	14	43			07	31	17	35	22	57	22	20
30	14	23			07	53	17	50	23	02	22	12
31	14	04			08	15			23	06		

The Second Year after Leap-Year.

Sun's Declination, 1714. 1718. 1722. 1726.

Days.	*July.*		*Auguſt.*		*Septem.*		*October.*		*Novem.*		*Decem.*	
	North.		North.		North.		South.		South.		South.	
1	22	04	15	06	04	18	07	20	17	42	23	07
2	21	54	14	48	03	55	07	42	17	58	23	11
3	21	46	14	30	03	32	08	05	18	14	23	15
4	21	37	14	11	03	08	08	27	18	29	23	19
5	21	28	13	52	02	45	08	50	18	45	23	22
6	21	18	13	33	02	22	09	12	18	59	23	24
7	21	08	13	14	01	59	09	34	19	14	23	26
8	20	57	12	54	01	35	09	56	19	28	23	28
9	20	46	12	35	01	12	10	17	19	42	23	28
10	20	35	12	15	00	48	10	40	19	56	23	29
11	20	23	11	55	00	25	11	00	20	09	23	29
12	20	11	11	35	00	02	11	22	20	22	23	29
13	19	59	11	14	Sou.	22	11	43	20	34	23	28
14	19	46	10	53	00	45	12	03	20	46	23	27
15	19	33	10	33	01	09	12	24	20	58	23	25
16	19	20	10	12	01	32	12	45	21	09	23	22
17	19	06	09	51	01	56	13	05	21	20	23	19
18	18	52	09	29	02	19	13	25	21	30	23	16
19	18	38	09	08	02	42	13	45	21	40	23	12
20	18	23	08	46	03	06	14	05	21	50	23	09
21	18	08	08	25	03	29	14	24	21	59	23	04
22	17	53	08	03	03	53	14	44	22	08	22	59
23	17	38	07	41	04	16	15	03	22	16	22	53
24	17	22	07	19	04	39	15	21	22	24	22	47
25	17	06	06	56	05	02	15	40	22	32	22	41
26	16	50	06	34	05	25	15	58	22	39	22	34
27	16	33	06	12	05	48	16	16	22	45	22	27
28	16	16	05	49	06	11	16	34	22	52	22	19
29	15	59	05	26	06	34	16	51	22	57	22	11
30	15	42	05	04	06	57	17	08	23	02	22	02
31	15	24	04	41			17	25			21	53

Third Year after Leap-Year.

Sun's Declination, 1715. 1719. 1723. 1727.

Days.	*Januar.*		*Februa.*		*March.*		*April.*		*May.*		*June.*	
	South.		South.		South.		North.		North.		North.	
1	21	43	13	49	03	28	08	32	18	02	23	09
2	21	33	13	29	03	04	08	54	18	17	23	13
3	21	23	13	09	02	41	09	15	18	32	23	17
4	21	12	12	48	02	17	09	37	18	46	23	20
5	21	01	12	27	01	54	09	58	19	01	23	22
6	20	50	12	06	01	30	10	20	19	14	23	24
7	20	38	11	46	01	06	10	41	19	28	23	26
8	20	25	11	24	00	43	11	02	19	41	23	27
9	20	13	11	03	00	19	11	22	19	54	23	28
10	20	00	10	41	Nor.	05	11	43	20	06	23	29
11	19	46	10	20	00	28	12	03	20	18	23	29
12	19	32	09	58	00	52	12	23	20	30	23	29
13	19	18	09	36	01	16	12	43	20	42	23	28
14	19	04	09	14	01	39	13	03	20	53	23	27
15	18	49	08	51	02	03	13	23	21	04	23	25
16	18	33	08	29	02	26	13	42	21	14	23	23
17	18	18	08	06	02	50	14	01	21	24	23	21
18	18	02	07	44	03	13	14	20	21	34	23	18
19	17	46	07	21	03	36	14	39	21	43	23	15
20	17	29	06	58	04	00	14	57	21	52	23	12
21	17	13	06	35	04	23	15	15	22	01	23	08
22	16	55	06	12	04	46	15	33	22	09	23	03
23	16	38	05	49	05	09	15	51	22	17	22	58
24	16	20	05	25	05	32	16	08	22	24	22	53
25	16	02	05	02	05	55	16	25	22	31	22	48
26	15	44	04	39	06	18	16	42	22	38	22	42
27	15	25	04	15	06	40	16	58	22	44	22	35
28	15	07	03	52	07	03	17	15	22	50	22	28
29	14	48			07	25	17	31	22	55	22	21
30	14	28			07	48	17	46	23	00	22	14
31	14	09			08	10			23	05		

The Third Year after Leap-Year.

Sun's Declination, 1715. 1719. 1723. 1727.

Days.	*July.* North.		*Auguſt.* North.		*Septem.* North.		*October.* South.		*Novem.* South.		*Decem.* South.	
1	22	05	15	11	04	23	07	14	17	38	23	06
2	21	57	14	53	04	00	07	37	17	54	23	10
3	21	49	14	34	03	57	08	00	18	10	23	14
4	21	40	14	16	03	14	08	22	18	26	23	18
5	21	30	13	57	02	51	08	44	18	41	23	21
6	21	20	13	38	02	28	09	06	18	56	23	23
7	21	10	13	19	02	04	09	28	19	11	23	25
8	21	00	12	59	01	41	09	50	19	25	23	27
9	20	49	12	40	01	18	10	12	19	39	23	28
10	20	38	12	20	00	54	10	34	19	52	23	29
11	20	26	12	00	00	31	10	55	20	06	23	29
12	20	14	11	40	00	07	11	17	20	19	23	29
13	20	02	11	19	Sou.	16	11	38	20	31	23	28
14	19	49	10	59	00	39	11	59	20	43	23	27
15	19	36	10	38	01	03	12	19	20	55	23	25
16	19	23	10	17	01	26	12	40	21	06	23	23
17	19	09	09	56	01	50	13	00	21	17	23	20
18	18	57	09	35	02	13	13	21	21	28	23	17
19	18	41	09	13	02	37	13	40	21	38	23	14
20	18	27	08	52	03	00	14	00	21	48	23	10
21	18	12	08	30	03	24	14	20	21	57	23	05
22	17	57	08	08	03	47	14	39	22	06	23	00
23	17	42	07	46	04	10	14	58	22	14	22	55
24	17	26	07	24	04	33	15	17	22	22	22	49
25	17	10	07	02	04	57	15	35	22	30	22	43
26	16	54	06	40	05	20	15	54	22	37	22	36
27	16	37	06	17	05	43	16	12	22	44	22	28
28	16	20	05	55	06	06	16	29	22	50	22	21
29	16	03	05	32	06	29	16	47	22	56	22	13
30	15	46	05	09	06	52	17	04	23	01	22	04
31	15	28	04	46			17	21			21	55

Leap-Year.

Sun's Declination, 1716. 1720. 1724. 1728.

Days.	*Januar.*		*Februa.*		*March.*		*April.*		*May.*		*June.*	
	South.		South.		South.		North.		North.		North.	
1	21	46	13	54	03	10	08	48	18	13	23	12
2	21	36	13	34	02	47	09	10	18	28	23	16
3	21	26	13	14	02	23	09	32	18	43	23	19
4	21	15	12	53	01	59	09	53	18	57	23	22
5	21	04	12	33	01	36	10	14	19	11	23	24
6	20	53	12	12	01	12	10	35	19	24	23	26
7	20	41	11	51	00	48	10	56	19	38	23	27
8	20	29	11	30	00	25	11	17	19	51	23	28
9	20	16	11	08	00	01	11	38	20	03	23	29
10	20	03	10	47	Nor.	23	11	48	20	16	23	29
11	19	50	10	25	00	46	12	19	20	28	23	29
12	19	36	10	03	01	10	12	38	20	39	23	28
13	19	22	09	41	01	34	12	58	20	50	23	27
14	19	07	09	19	01	57	13	18	21	01	23	26
15	18	52	08	57	02	21	13	37	21	12	23	24
16	18	37	08	34	02	44	13	56	21	22	23	22
17	18	21	08	12	03	08	14	15	21	32	23	19
18	18	06	07	49	03	31	14	34	21	41	23	16
19	17	50	07	26	03	54	14	52	21	50	23	12
20	17	34	07	03	04	17	15	11	21	59	23	09
21	17	17	06	40	04	41	15	28	22	07	23	04
22	17	00	06	17	05	04	15	46	22	15	23	59
23	16	42	05	54	05	27	16	04	22	23	22	54
24	16	25	05	31	05	49	16	21	22	30	22	49
25	16	07	05	08	06	12	16	38	22	36	22	43
26	15	48	04	44	06	35	16	54	22	43	22	37
27	15	30	04	21	06	57	17	11	22	49	22	30
28	15	11	03	57	07	20	17	27	22	54	22	23
29	14	52	03	34	07	42	17	43	22	58	22	16
30	14	33			08	04	17	58	23	04	22	08
31	14	13			08	26			23	08		

Leap-Year.

Sun's Declination, 1716. 1720. 1724. 1728.

Days.	*July.*		*Auguſt.*		*Septem.*		*October.*		*Novem.*		*Decem.*	
	North.		North.		North.		South.		South.		South.	
1	21	59	14	57	04	06	07	33	17	50	23	09
2	21	51	14	39	03	43	07	54	18	06	23	13
3	21	42	14	20	03	20	08	14	18	22	23	17
4	21	32	14	01	02	57	08	39	18	37	23	20
5	21	23	13	42	02	33	09	01	18	52	23	23
6	21	13	13	23	02	10	09	23	19	07	23	25
7	21	02	13	04	01	47	09	45	19	22	23	26
8	20	51	12	44	01	23	10	07	19	36	23	28
9	20	40	12	24	01	00	10	29	19	49	23	29
10	20	29	12	04	00	36	10	50	20	02	23	29
11	20	17	11	44	00	13	11	11	20	15	23	29
12	20	05	11	24	Sou.	10	11	33	20	28	23	28
13	19	53	11	04	00	34	11	54	20	40	23	27
14	19	39	10	43	00	57	12	14	20	52	23	26
15	19	26	10	22	01	21	12	35	21	03	23	24
16	19	13	10	01	01	44	12	55	21	15	23	21
17	18	59	09	40	02	08	13	16	21	25	23	18
18	18	45	09	18	02	31	13	36	21	35	23	15
19	18	30	08	57	02	55	13	55	21	45	23	11
20	18	16	08	35	03	18	14	15	21	54	23	06
21	18	01	08	13	03	41	14	34	22	03	23	01
22	17	45	07	52	04	05	14	54	22	12	22	56
23	17	30	07	29	04	28	15	12	22	20	22	50
24	17	14	07	07	04	51	15	31	22	28	22	44
25	16	58	06	45	05	14	15	49	22	35	22	37
26	16	41	06	23	05	37	16	07	22	42	22	30
27	16	24	06	00	06	00	16	25	22	48	22	23
28	16	07	05	37	06	23	16	43	22	54	22	15
29	15	50	05	15	06	46	17	00	23	00	22	06
30	15	33	04	52	07	09	17	17	23	05	21	57
31	15	15	04	29			17	34			21	48

A Deſcription *of the* TABLES *of the Sun's Declination.*

THeſe *Tables* are in general for Four Years; *Leap-Year*, *Firſt*, *Second*, and *Third Year* after *Leap-Year*; but conſequental for any Year.

Each *Year* taking up two *Pages*, hath the firſt Six Months of the Year on the Left-hand Page, and the laſt Six Months on the Right-hand Page; the *Names of the Months* are at the Head of each Column, with the *Days of each Month* in the Left-hand Column of each *Page*.

The *Firſt Table* ſheweth the *Sun's Declination* every Day for the Firſt Year after Leap-Year, being 1713, 1717, 1721, 1725, *&c.* and takes up Page (10) and (11) The *Second Table* is for 1714, 1718, 1722, 1726, *&c.* being *Second Years* after *Leap-Year* in Page (12) and (13) The next *Table* in Page (14) and (15) is for the *Third Year* after *Leap-Year*: The *Fourth Table* in Page (16) and (17) ſheweth the *Sun's Declination* for *Leap-Year*, being 1716, 1720, 1724, 1728, *&c.*

Under the Name of the Month, is the *Name of the Declination*, either *North* or *South*, only the Columns for *March*, and *September* are two Names; that is, under *March* is *South*, and againſt the 10th Day is *Nor.* for *North*; and under *September* is *North*, and againſt the 12th or 13th Day is *Sou.* for *South*; intimating the *Declination is South* in *March*, till the 10th Day, and all the remaining part of that Month it's *Nor.* or *North*; in like manner in *September*, it's *North* till the 12th or 13th Day, and from thence to the Months end it's *Sou.* or *South*.

The

The Uſe of the Tables of Declination.

TO find the Sun's Declination for any Day in any Year, is after this manner.

1. Seek the Year and Month at the Head of the Table; with the Day of the Month in the Left-hand Column.

2. Then right againſt the *Day* of the Month (in the Left-hand Column) and under the Month at the Head is the Sun's Declination required.

Example 1. I deſire to know the Sun's Declination for the 24th Day of *April* 1718.

The Year 1718, is the *Second-Year* after *Leap-Year*, which is in Page (12) then under *April*, and againſt 24 (under Days) is 16 12, with North at the Head of the Table under *April*; which ſheweth the Sun's Declination on the 24th of *April* 1718, is 16d. 12m. North.

Example 2. What is the Sun's Declination for the 10th Day of *March* 1719?

The Year 1719, being the *Third Year* after *Leap-Year*, is found in Page 14; then againſt the 10th Day, under *March* is Nor. 04, ſignifying the Sun's Declination at that time given, is 0d. 4m. North; the like do for any other time.

A Table whereby you may proportion the Sun's Declination to any other Meridian.

East West } Long. with Decl. { Incr. Decr. } Subt. but Decl. { Dec. Incr. } add

Degrees of Longitude.	*The daily difference in Declination.*											
	m. 2	m. 4	m. 6	m. 8	m. 10	m. 12	m. 14	m. 16	m. 18	m. 20	m. 22	m. 24
	m.	m.	m.	m.	m.	m	m.	m.	m.	m.	m.	m.
15	0	9	0	0	0	0	1	1	1	1	1	1
30	0	0	0	1	1	1	1	1	1	2	2	2
45	0	0	1	1	1	1	2	2	2	2	3	3
60	0	1	1	1	2	2	2	3	3	3	4	4
75	0	1	1	2	2	2	3	3	4	4	5	5
90	0	1	1	2	2	3	3	4	4	5	5	6
105	1	1	2	2	3	3	4	5	5	6	6	7
120	1	1	2	3	3	4	5	5	6	7	7	8
135	1	1	2	3	4	4	5	6	7	7	8	9
150	1	2	2	3	4	5	6	7	7	8	9	10
165	1	2	3	4	5	5	6	7	8	9	10	11
180	1	2	3	4	5	6	7	8	9	10	11	12

The Uſe of this Table of Proportion.

THE Tables of the *Sun's Declination* are calculated for the Meridian of *London*, and will ſerve any place under that Meridian; but for thoſe places ſituate Eaſterly or Weſterly from it, the *Declination* muſt be proportioned according to his daily Difference in the Table, and Longitude of thoſe places, from the Meridian of *London*, for which purpoſe this Table is uſeful, as is evident by theſe Examples following.

Ex-

Example 1.

Admit the 10*th* day of *April*, *Anno* 1720, I am in Longit. 105 d. Eaſt; I demand what Declination the Sun will have that Day in the Meridian of that Place?

The Declination for *April* 10. on the Meridian of *London* is 11. d. 58 m. increaſing, and the daily difference at that time is 20 m. Therefore in this Table, I look in the head thereof for the neareſt number to 20 m. which is 20 m. then I look on the Leſt-hand of the Table for 105 d. the Longitude that I am in, and in the common Angle of meeting I find 6, which is to be deducted from the Declination in the Meridian of *London* aforeſaid 11 d. 58 m. and the Remainder will be the Declination for that Meridian, or the Longitude that I am in, which is 11 d. 52 m. North. But if the Declination had decreaſed, as it doth here increaſe, then you muſt have added as here-under you may ſee.

	d.	m.	
The Declination in the Meridian of London	11	58	N.
The proportional Minute ſubtract,	00	06	
The Declin. *for the Longitude of* 105*d*. *E*. is	11	52	N.
The Declin. *for the Longitude of* 105*d*. *W*. is	12	04	N.

Example 2.

Admit the 10*th* Day of *October*, *Anno* 1718, I am in Longitnde 87 d. Weſt, I demand the Declination, that the Sun will have that Day in the Meridian?

The daily Difference in the Table of Declination, at this time is 21 m. and the Proportional part thereof by the laſt Table is 5 m.

	d.	m.	
The Declination *in the Meridian of* London,	10	38	S.
The proportional Minutes, add	00	05	
The Declin. *in the Longitude of* 87 *d*. W. is	10	43	S.
The Declin. *in the Longitude of* 87 *d*. E. is	10	33	S.

A Table of the Refractions of Sun, Moon, *and* Stars *according to the Obſervations of* Tycho Brahe.

Altitudes.	*Sun.* ′	*Moon.* ′	*Stars.* ′	*Altitudes.*	*Sun.* ′	*Moon.* ′
0	34	33	30	18	06	06
1	26	25	21	19	05	06
2	20	20	15	20	04	05
3	17	17	12	21	04	05
4	15	15	11	22	03	04
5	14	14	10	23	03	04
6	13	13	09	24	03	04
7	12	13	08	25	02	03
8	11	12	07	26	02	03
9	10	11	06	27	02	03
10	10	11	05	28	02	02
11	09	10	05	29	02	02
12	09	09	04	30	01	02
13	08	09	04	31	01	02
14	08	08	03	32	01	01
15	07	08	03	33	01	01
16	07	07	02	34	01	01
17	06	07	02	35	01	01

The Refraction of the *Sun*, *Moon*, and *Stars*, cauſeth them to appear higher above the *Horizon* than they are; therefore the Refraction is always to be ſubtracted from the *Altitude* obſerved, that the true *Altitude* may be had,

As admit the Sun's Meridian Altitude, by Obſervation to be 5d. I demand the true Altitude?

	d.	m.
Altitude by Obſervation	05	00
Refraction, ſubtract	00	14
The true Meridian Altitude	04	46

Primum

Primum Mobile;

O R,

Aſtronomical Tables.

Each Table being a SUN DIAL:

SHEWING

The Exact Hour of the Day, the Sun being upon any Point of the Compaſs, fitting all Places upon the Earth and Sea, that lie between the *Equinoctial* and 60d. of Latitude, either North or South: And to laſt with Exactneſs as long as the Great and Everlaſting Creator ſhall be pleaſed to hold together the great and wonderful Fabrick of Nature.

A Sun-Dial for the Latitude of 0 *Degree.*

North Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d 30m	23 d 30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
North	12	12	12	12	12	12	12	12	12	12	12
n *by* w	Zen. West.	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.17	0.19	0.20
n n w		0.04	0.08	0.12	0.17	0.21	0.25	0.30	0.35	0.39	0.42
nw*by*n		0.07	0.13	0.20	0.27	0.34	0.41	0.49	0.56	1.03	1.00
n w		0.10	0.20	0.30	0.41	0.51	1.02	1.14	1.25	1.36	1.47
nw*b*w		0.15	0.30	0.45	1.01	1.18	1.35	1.53	2.12	2.32	2.52
w nw		0.24	0.49	1.14	1.41	2.09	2.41	3.18	4.06	5.07	
w *by*u		0.51	1.44	2.46	4.10						
Weſt.	6.00										
☉ ſet.	6.00	6.00	6.00	5.00	6.00	6.00	6.00	6.00	5.00	6.00	6.00
Sun's	d.m.	d.m	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amn.	0.00	2.30	5.00	7.30	10.0	12.30	15.0	17.30	20.0	22.30	23.30

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d 30m	23 d
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	Zen. West.	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.17	0.19	0.20
ss w		0.04	0.08	0.12	0.17	0.21	0.25	0.30	0.35	0.39	0.42
s w*by*s		0.07	0.13	0.20	0.27	0.34	0.41	0.49	0.56	1.03	1.08
s w		0.10	0.20	0.30	0.41	0.51	1.02	1.14	1.25	1.35	1.47
sw*b*w		0.15	0.30	0.45	1.01	1.18	1.35	1.53	2.12	2.32	2.52
w s w		0.24	0.49	1.14	1.41	2.09	2.41	3.18	4.06	5.07	
w *by* s		0.50	1.44	2.46	4.10						
Weſt	6.00										
☉ ſet.	6.00	6.00	6.00	6.00	6.00	6.00	6.00	5.00	6.00	6.00	6.00

A Sun-Dial for the Latitude of 1 *Degree.*

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
North	12	12	12	12	12	12	12	12	12	12	12
n *by* w	Zen. Weſt.	0.01	0.03	0.05	0.07	0.09	0.11	0.14	0.16	0.18	0.19
n n w		0.02	0.07	0.11	0.14	0.20	0.24	0.28	0.33	0.37	0.40
nw*by*n		0.04	0.11	0.17	0.24	0.31	0.38	0.46	0.53	1.00	1.05
n w		0.06	0.16	0.26	0.37	0.47	0.58	1.09	1.21	1.31	1.39
nw*b*w		0.09	0.24	0.40	0.56	1.12	1.29	1.51	2.06	2.23	2.37
w n w		0.15	0.39	1.05	1.35	2.00	2.32	3.09	3.53	5.00	
w *by*n		0.30	1.24	2.25	3.48						
Weſt.	6.00										
⊙ ſet.	6.00	6.00	6.00	6.00	6.01	6.01	6.01	6.01	6.01	6.02	6.02
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	2.30	5.00	7.30	10.0	12.30	15.0	17.30	20.0	22.0	23.30

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.01	0.03	0.05	0.07	0.09	0.11	0.13	0.15	0.17	0.19	0.21
s s w	0.02	0.06	0.10	0.14	0.18	0.23	0.27	0.32	0.37	0.40	0.43
sw*by*s	0.03	0.09	0.16	0.23	0.30	0.37	0.44	0.51	0.59	1.05	1.10
s w	0.04	0.14	0.24	0.34	0.45	0.55	1.06	1.17	1.29	1.39	1.47
sw*b* w	0.06	0.21	0.36	0.52	1.08	1.12	1.41	1.59	2.18	2.35	2.49
w sw	0.10	0.34	0.58	1.24	1.51	2.19	2.51	3.28	4.16	5.19	
w *by* s	0.20	1.11	2.04	3.05	4.28						
Weſt.	6.00										
⊙ ſet	6.00	6.00	6.00	6.00	5.59	5.59	5.59	5.59	5.59	5.58	5.58

A Sun-Dial for the Latitude of 2 Degree.

North Declination.

0 d		2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
		30m		30m		30m		30m			30m
h m	Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
12	North	12	12	12	12	12	12	12	12	12	12
0.02	n *by* w	Zen. Weſt.	0.02	0.04	0.07	0.09	0.11	0.13	0.15	0.17	0.18
0.03	n n w		0.05	0.09	0.13	0.18	0.22	0.27	0.32	0.36	0.38
0.05	nw*by*n		0.08	0.15	0.22	0.29	0.36	0.43	0.51	0.57	1.01
0.08	n w		0.12	0.22	0.33	0.43	0.54	1.05	1.17	1.27	1.35
0.12	nw*b*w		0.18	0.37	0.49	1.05	1.22	1.40	2.00	2.16	2.30
0.16	w nw		0.29	0.55	1.21	1.50	2.21	2.58	3.45	4.46	
0.40	w *by*n		1.03	2.03	3.23						
6.00	Weſt.	6.00									
6.00	☉ ſet.	6.00	6.00	6.01	6.01	6.02	6.02	6.02	6.03	6.03	6.04
d.m.	Sun's	d.m.	d.m	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
0.00	Amp.	23.0	5.00	7.30	10.0	12.30	15.0	17.31	20.1	22.1	23.3

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m		30m	
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Sou h	12	12	12	12	12	12	12	12	12	12	12
s *by*w	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.16	0.18	0.20	0.22
ss w	0.03	0.97	0.12	0.16	0.20	0.25	0.29	0.34	0.38	0.42	0.45
s w*by*s	0.05	0.12	0.19	0.25	0.32	0.39	0.46	0.54	1.01	1.08	1.11
s w	0.08	0.18	0.29	0.38	0.49	0.59	1.10	1.21	1.33	1.43	1.51
sw*b*w	0.12	0.27	0.42	0.57	1.13	1.29	1.46	2.04	2.23	2.40	2.54
w s w	0.16	0.43	1.08	1.33	2.00	2.28	3.00	3.36	4.24	5.24	
w *by* s	0.40	1.30	2.22	3.2	1.43						
Weſt	6.00										
☉ ſet.	6.00	5.00	6.00	5.59	5.59	5.58	5.58	5.58	5.57	5.57	5.54

A Sun-Dial for the Latitude of 3 *Degrees.*

North Declination.

0 d		2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22d	23 d
0 m		30m		30m		30m		30m			30m
h m	Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
12	North	12	12	12	0 m	12	12	12	12	12	12
0.02	n *by* w	Zen. Weſt.	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.16	0.18
0.05	n n w		0.03	0.07	0.12	0.16	0.21	0.25	0.30	0.34	0.37
0.08	nw *by* n		0.05	0.12	0.19	0.26	0.33	0.40	0.48	0.54	0.59
0.12	n w		0.08	0.19	0.29	0.35	0.50	1.01	1.13	1.23	1.31
0.18	nw*b* w		0.12	0.27	0.43	0.59	1.16	1.34	1.54	2.10	2.24
0.29	w n w		0.20	0.45	1.11	1.39	2.11	2.47	3.33	4.31	
0.59	w *by* n		0.42	1.40	2.57						
6.00											
6.00	☉ ſet.	6.00	6.01	6.01	6.02	6.02	6.03	6.04	6.04	6.05	6.05
d.m.	Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
0.00	Amp.	2.30	5.00	7.30	10.1	12.31	15.1	17.31	20.2	22.2	23.32

South Declination.

Deg.	d0	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.02	0.04	0.06	0.08	0.10	0.13	0.15	0.17	0.19	0.21	0.22
s s w	0.05	0.09	0.13	0.18	0.22	0.26	0.31	0.35	0.40	0.44	0.47
sw *by* s	0.08	0.15	0.21	0.28	0.35	0.42	0.49	0.56	1.04	1.10	1.15
s w	0.12	0.22	0.32	0.42	0.53	1.03	1.14	1.25	1.37	1.47	1.55
sw*b*w	0.18	0.33	0.48	1.03	1.19	1.35	1.52	2.19	2.30	2.46	3.00
w s w	0.29	0.53	1.17	1.42	2.09	2.37	3.08	3.43	4.31	5.29	
w *by* s	0.55	1.48	2.40	3.38	4.55						
Weſt.	6.00										
☉ ſet.	6.00	6.00	5.59	5.59	5.58	5.58	5.56	5.56	5.56	5.55	5.55

A Sun-Dial for the Latitude of 4 *Degrees.*

North Declination.

Deg.	2 d		5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.	30m			30m		30m		30m			30m
Point.	h m	Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	North	12	12	12	12	12	12	12	12	12
s *by* w	0.01	n *by* w	0.01	0.03	0.05	0.07	0.09	0.11	0.13	0.15	0.17
s s w	0.02	n n w	0.02	0.06	0.10	0.14	0.19	0.23	0.28	0.32	0.35
s w*by*s	0.04	nw *b* n	0.03	0.09	0.16	0.23	0.30	0.38	0.45	0.52	0.57
s w	0.06	n w	0.04	0.14	0.21	0.35	0.46	0.57	1.09	1.19	1.27
s w *b*w	0.09	nw*b* w	0.05	0.21	0.37	0.53	1.10	1.28	1.47	2.04	2.17
w s w	0.14	w n w	0.10	0.35	1.01	1.29	2.00	2.36	3.21	4.17	
w *by* s	0.29	w *by* n	0.21	1.17	2.29						
Weſt.	3.25										
☉ ſet.	6.00	☉ ſet.	6.01	6.02	6.03	6.03	6.04	6.05	6.06	6.06	6.07
Sun's	d.m.	Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	2.30	Amp.	5 00	7.31	10.1	12.31	15.1	17.32	20.3	22.3	23.34

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.03	0.05	0.07	0.09	0.11	0.13	0.16	0.18	0.20	0.22	0.23
s s w	0.07	0.11	0.15	0.19	0.23	0.28	0.32	0.36	0.41	0.45	0.48
s w*by*s	0.11	0.17	0.24	0.31	0.38	0.45	0.52	0.59	1.07	1.13	1.18
s w	0.16	0.26	0.36	0.46	0.57	1.07	1.18	1.29	1.41	1.51	1.59
s w*b*w	0.24	0.39	0.54	1.09	1.25	1.41	1,58	2.16	2.35	2.52	3.55
w s w	0.38	1.02	1.26	1.51	2.17	2.45	3.17	3.52	4.38	5.33	
w *by* s	1.17	2.05	2.55	3.51	5.03						
Weſt.	6.00										
☉ ſet.	6.00	6.00	5.59	5.58	5.57	5.57	5.56	5.55	5.54	5.54	5.53

A Sun-Dial for the Latitude of 5 Degrees.

North Declination.

Deg. Min.	2 d 30m		5 d	7 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	Point	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	North	12	12	12	12	12	12	12	12	12
s *by* w	0.02	n *by* w	Zen. West.	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.16
s s w	0.04	n n w		0.04	0.08	0.13	0.17	0.22	0.26	0.30	0.33
sw *by* s	0.07	nw *by* n		0.07	0.14	0.21	0.28	0.35	0.43	0.49	0.54
s w	0.10	n w		0.10	0.20	0.31	0.42	0.53	1.05	1.15	1.22
s w *b* w	0.19	nw *b* w		0.15	0.31	0.47	1.04	1.21	1.40	1.57	2.10
w s w	0.24	w n w		0.25	0.51	1.18	1.49	2.24	3.08	4.00	
w *by* s	0.48	w *by* n		0.54	2.01						
Weſt.	4.00										
⊙ ſet.	6.01	⊙ ſet.	6.02	6.03	6.04	6.04	6.05	6.06	6.07	6.08	6.09
Sun's Amp.	d.m. 2.30	Sun's Amp.	d.m 5.01	d.m. 7.31	d.m. 10.2	d.m. 12.32	d.m. 15.3	d.m. 17.34	d.m. 20.5	d.m. 22.5	d.m 23.26

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.04	0.06	0.08	0.10	0.12	0.14	0.16	0.18	0.20	0.22	0.24
s s w	0.08	0.12	0.17	0.21	0.25	0.29	0.34	0.38	0.43	0.47	0.50
sw *by* s	0.13	0.20	0.27	0.33	0.40	0.47	0.54	1.02	1.09	1.16	1.21
s w	0.20	0.30	0.40	0.50	1.00	1.11	1.22	1.33	1.45	1.55	2.02
sw *b* w	0.30	0.45	1.00	1.15	1.34	1.46	2.03	2.21	2.40	2.56	3.11
w s w	0.48	1.11	1.35	2.00	2.26	2.53	3.24	3.59	4.43	5.35	
w *by* s	1.35	2.21	3.09	4.03	5.11						
Weſt.	6.00										
⊙ ſet.	6.00	5.59	5.58	5.57	5.56	5.56	5.55	5.54	5.53	5.52	5.51

A Sun-Dial for the Latitude of 6 Degrees.

North Declination.

Deg. Min.	2 d 30m	5 d		7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	Point.	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	North	12	12	12	12	12	12	12	12
s *by* w	0.03	0.01	n *by* w	0.01	0.03	0.05	0.07	0.09	0.11	0.13	0.15
s s w	0.06	0.02	n n w	0.03	0.07	0.11	0.15	0.20	0.24	0.28	0.31
s w *by* s	0.09	0.03	nw *b* n	0.04	0.11	0.18	0.25	0.32	0.40	0.46	0.51
s w	0.14	0.04	n w	0.06	0.16	0.27	0.38	0.49	1.01	1.10	1.18
sw *b* w	0.21	0.06	nw *b* w	0.09	0.25	0.41	0.57	1.15	1.34	1.50	2.04
w s w	0.33	0.10	w n w	0.15	0.40	1.08	1.38	2.12	2.55	3.44	
w *by* s	1.06	0.20	w *by* n	0.32	1.34	3.24					
Weſt.	4.22	2.15									
☉ ſet.	6.01	6.02	☉ ſet.	6.03	6.04	6.05	6.06	6.07	6.09	6.10	5.11
Sun's Amp.	d.m. 2.30	d.m. 5 01	Sun's Amp.	d.m. 7.32	d.m. 10.3	d.m. 12.34	d.m. 15.5	d.m. 17.36	d.m. 20.6	d.m. 22.7	d.m. 23.39

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	d 20	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.05	0.07	0.09	0.11	0.13	0.15	0.17	0.19	0.21	0.23	0.24
s s w	0.10	0.14	0.18	0.22	0.27	0.31	0.35	0.40	0.44	0.48	0.51
s w *by* s	0.16	0.23	0.29	0.36	0.43	0.50	0.57	1.04	1.12	1.18	1.23
s w	0.24	0.34	0.44	0.50	1.04	1.15	1.25	1.37	1.48	1.58	2.00
s w *b* w	0.36	0.50	1.05	1.20	1.36	1.52	2.08	2.26	2.45	3.02	3.15
w s w	0.57	1.20	1.44	2.08	2.34	3.01	3.31	4.06	4.48	5.37	
w *by* s	1.51	2.35	3.22	4.13	5.16						
Weſt.	6.00										
☉ ſet.	6.00	5.59	5.58	5.57	5.56	5.55	5.54	5.53	5.51	5.50	5.49

A Sun Dial for the Latitude of 7 Degrees.

North Declination.

Deg. Min.	2 d 30m	5 d		7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	Point.	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	North	12	12	12	12	12	12	12	12
s *by* w	0.04	0.02	n *by* w	0.00	0.02	0.04	0.07	0.09	0.11	0.13	0.14
s s w	0.07	0.03	n n w	0.01	0.05	0.09	0.14	0.18	0.23	0.27	0.30
s w*by*s	0.12	0.05	nw *b* n	0.01	0.08	0.15	0.22	0.29	0.36	0.44	0.48
s w	0.18	0.08	n w	0.02	0.12	0.23	0.33	0.45	0.56	1.06	1.14
s w*b*w	0.27	0.12	nw*b* w	0.03	0.18	0.34	0.51	1.08	1.27	1.43	1.57
w s w	0.43	0.19	w n w	0.05	0.30	0.57	1.27	2.00	2.42	3.28	
w *by* s	1.23	0.39	w *by* n	1.10	0.08	2.36					
Weſt	4.37	2.58									
⊙ ſet.	6.01	6.02	⊙ ſet.	6.03	6.05	6.06	6.08	6.09	6.10	6.11	6.12
Sun's Amp.	d.m. 2.31	d.m. 5.02	Sun's Amp.	d.m. 7.33	d.m. 10.4	d.m. 12.35	d.m. 15.7	d.m. 17.38	d.m. 20.9	d.m. 22.10	d m. 23.42

South Declination.

Deg. Min.	0 d	2 d 30m	d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.06	0.07	0.09	0.11	0.13	0.16	0.18	0.20	0.22	0 24	0.25
s s w	0.12	0.16	0.20	0.24	0.28	0.33	0.37	0.41	0.46	0.50	0.53
s w*by*s	0.19	0.25	0.32	0.39	0.45	0.52	0.59	1.07	1.13	1.21	1.25
s w	0.28	0.38	0.48	0.58	1.08	1.18	1.29	1.40	1.52	2.02	2.09
s w*b* w	0.41	0.56	1.11	1.26	1.41	1.57	2.14	2.31	2.50	3.06	3.19
w s w	1.06	1.29	1.52	2.16	2.41	3.08	3.38	4.22	4.53	5.39	
w *by* s	2.06	2.49	3.33	4.22	5.20						
Weſt.	6.00										
⊙ ſet	6.00	5.59	5.58	5.57	5.55	5.54	5.52	5.51	5.50	5.49	5.48

A Sun Dial for the Latitude of 8 *Degrees.*

North Declination.

Deg.	2 d	5 d	7 d		10 d	12 d	15 d	17 d	20 d	22 d	23
Min.	30m		30m			30m		30m			30
Point.	h m	h m	h m	Point.	h m	h m	h m	h m	h m	h m	h
South	12	12	12	North	12	12	12	12	12	12	1
s *by* w	0.04	0.02	0.00	n *by* w	0.02	0.04	0.06	0.08	0.10	0.12	0.
s s w	0.09	0.05	0.01	n n w	0.03	0.08	0.12	0.17	0.21	0.25	0.
s w*bys*	0.15	0.08	0.01	nw *b* n	0.05	0.12	0.20	0.27	0.34	0.41	0.
s w	0.22	0.12	0.02	n w	0.08	0.18	0.29	0.40	0.52	1.02	0.0
s w*b*w	0.33	0.18	0.03	nw*b* w	0.12	0.28	0.43	1.00	1.19	1.35	1.
w s w	0.52	0.29	0.05	w n w	0.20	0.46	1.16	1.48	2.28	3.11	4.0
w *by* s	1.39	0.56	0.10	w *by* n	0.44	1.59					
Weſt	4.48	3.36	1.22								
⊙ ſet.	6.01	6.03	6.04	⊙ ſet.	6.06	6.07	6.09	6.10	6.12	6.13	6.
Sun's	d.m.	d.m.	d.m.	Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d
Amp.	2.31	5.02	7.34	Amp.	10.6	12.37	15.9	17.40	20.12	22.13	23

South Declination.

Deg	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.06	0.08	0.10	0.12	0.14	0.16	0.18	0.21	0.23	0.25	0.2
s s w	0.13	0.17	0.21	0.26	0.30	0.34	0.38	0.43	0.47	0.51	0.5
s w*bys*	0.21	0.28	0.34	0.41	0.48	0.55	1.02	1.09	1.17	1.23	1.2
s w	0.32	0.41	0.51	1.01	1.11	1.22	1.33	1.44	1.55	2.05	2.1
sw*b* w	0.47	1.02	1.16	1.31	1.46	2.02	2.17	2.35	2.53	3.09	3.2
w s w	1.14	1.37	2.00	2.24	2.48	3.15	3.44	4.17	4.56	5.39	
w *by* s	2.20	3.01	3.44	4.26	5.24						
Weſt	6.00										
⊙ ſet	6.00	5.59	5.57	5.56	5.54	5.53	5.51	5.50	5.48	5.47	5.4

A Sun-Dial for the Latitude of 9 Degrees.

North Declination.

Deg.	2 d	5 d	7 d		10 d	12 d	15 d	17 d	20 d	22d	23 d
Min.	30m		30m			30m		30m			30m
Point.	h m	h m	h m	Point	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	North	12	12	12	12	12	12	12
s *by* w	0.05	0.03	0.01	n *by* w	0.01	0.03	0.05	0.07	0.09	0.11	0.12
s s w	0.11	0.07	0.03	n n w	0.02	0.06	0.10	0.14	0.19	0.23	0.26
sw *by* s	0.17	0.11	0.04	nw*by*n	0.03	0.10	0.17	0.24	0.31	0.38	0.43
s w	0.26	0.16	0.06	n w	0.04	0.14	0.25	0.36	0.47	0.57	1.05
s w*b*w	0.38	0.24	0.09	nw*b* w	0.06	0.22	0.38	0.55	1.14	1.30	1.42
w s w	1.00	0.38	0.14	w n w	0.10	0.36	1.04	1.36	2.15	2.55	3.42
w *by* s	1.53	1.13	0.29	w *by* n	0.21	1.27					
Weſt.	4.56	3.46	2.15								
☉ ſet.	6.01	6.03	6.04	☉ ſet.	6.06	6.08	6.10	6.12	6.14	6.15	6.16
Sun's	d.m.	d.m.	d.m.	Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	2.31	5.03	7.35	Amp.	10.7	12.39	15.11	17.43	20.16	22.18	23.50

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.07	0.09	0.11	0.13	0.15	0.17	0.19	0.21	0.24	0.25	0.27
s s w	0.15	0.19	0.23	0.27	0.31	0.36	0.40	0.44	0.49	0.54	0.56
sw *by* s	0.24	0.30	0.37	0.44	0.50	0.57	1.04	1.12	1.19	1.25	1.31
s w	0.36	0.45	0.55	1.05	1.15	1.26	1.36	1.47	1.59	2.09	2.16
sw*b*w	0.53	1.07	1.22	1.36	1.52	2.07	2.24	2.41	2.59	3.15	3.28
w s w	1.23	1.45	2.08	2.31	2.55	3.21	3.50	4.22	5.00	5.40	
w *by* s	2.33	3.12	3.53	4.36	5.27						
Weſt.	6.00										
☉ ſet.	6.00	5.59	5.57	5.56	5.54	5.52	5.50	5.48	5.46	5.45	5.44

A Sun-Dial for the Latitude of 10 *Degrees.*

North Declination.

Deg.	2 d	5 d	7 d	10 d		12 d	15 d	17 d	20 d	22 d	23 d
Min.	30m		30m			30m		30m			30m
Point.	h m	h m	h m	h m	Point	h m	h m	h m	h m	h m	h m
South	12	12	21	12	North	12	12	12	12	12	12
s *by* w	0.06	0.04	0.02	Zen. Weſt.	n *by* w	0.02	0.04	0.06	0.08	0.10	0.12
s w	0.12	0.08	0.04		n n w	0.04	0.09	0.13	0.18	0.21	0.24
sw*by*s	0.20	0.13	0.07		n w *b*n	0.07	0.14	0.21	0.29	0.35	0.40
s w	0.30	0.17	0.10		n w	0.10	0.21	0.32	0.43	0.53	1.00
sw*b*w	0.44	0.30	0.15		n w*b*w	0.15	0.32	0.49	1.06	1.23	1.35
w s w	1.09	0.47	0.24		w n w	0.25	0.53	1.24	2.01	2.39	3.19
w *by*s	2.07	1.28	0.47		w *by* n	0.59	1.07				
Weſt.	5.03	4.01	2.47								
☉ ſet	6.02	6.04	6.05	6.07	☉ ſet.	6.09	6.11	6.13	6.15	6.17	6.18
Sun's	d.m.	d.m.	d.m.	d.m.	Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	2.32	5.05	7.37	10.10	Amp.	12.42	15.15	17.47	20.20	22.22	23.54

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.08	0.10	0.12	0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.27
s s w	0.16	0.21	0.25	0.29	0.33	0.37	0.42	0.46	0.51	0.54	0.57
sw *by*s	0.26	0.33	0.40	0.46	0.53	1.00	1.07	1.14	1.22	1.28	1.33
s w	0.39	0.49	0.56	1.09	1.19	1.29	1.40	1.51	2.02	2.12	2.19
sw*b* w	0.58	1.13	1.27	1.42	1.57	2.12	2.28	2.45	3.03	3.19	3.32
w s w	1.31	1.53	2.15	2.38	3.02	3.27	3.55	4.26	5.03	5.41	
w *by* s	2.44	3.22	4.01	4.42	5.29						
Weſt.	6.00										
☉ ſet.	6.00	5.58	5.56	5.55	5.53	5.51	5.46	5.47	5.45	5.43	4.42

A Sun-Dial for the Latitude of 11 *Degrees.*

North Declination.

Deg Min,	2 d 30m	5 d	7 d 30m	10 d		12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	Point.	h m	h m	h m	h m	h m	h m
South	12	12	12	12	North	12	12	12	12	12	12
s *by* w	0.07	0.05	0.03	0.01	n *by* w	0.01	0.03	0.05	0.07	0.09	0.11
s s w	0.14	0.10	0.06	0.02	n n w	0.02	0.07	0.11	0.16	0.20	0.22
s w *by* s	0.21	0.16	0.11	0.03	n w *b*n	0.04	0.11	0.18	0.26	0.34	0.43
s w	0.34	0.24	0.14	0.04	n w	0.06	0.17	0.28	0.39	0.42	0.56
s w *b* w	0.50	0.35	0.21	0.06	n w *b* w	0.09	0.25	0.42	1.00	1.15	1.28
w s w	1.17	0.56	0.33	0.08	w n w	0.15	0.41	1.12	1.47	2.23	2.59
w *by* s	2.19	1.43	1.03	0.20	w *by* n	0.33	1.55				
Weſt.	5.08	4.13	3.09	2.19							
⊙ ſet.	6.02	6.04	5.06	6.08	⊙ ſet.	6.10	6.12	5.14	5.16	6.18	5.19
Sun's Amp.	d.m. 2.32	d.m. 5.05	d.m. 7.38	d.m. 10.11	Sun's Amp.	d.m. 12.44	d.m. 15.17	d.m. 17.50	d.m. 20.24	d.m. 22.27	d.m. 23.5

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by*w	0.09	0.11	0.13	0.15	0.17	0.19	0.21	0.23	0.25	0.27	0.28
ss w	0.18	0.22	0.26	0.30	0.34	0.39	0.43	0.47	0.52	0.56	0.59
s w*by*s	0.29	0.37	0.42	0.49	0.55	1.02	1.09	1.16	1.24	1.30	1.35
s w	0.43	0.53	1.03	1.12	1.22	1.33	1.43	1.54	2.05	2.15	2.22
s w *b* w	1.04	1.18	1.32	1.47	2.01	2.17	2.33	2.49	3.07	3.23	3.35
w s w	1.39	2.01	2.22	2.45	3.10	3.33	4.00	4.30	5.05	5.41	
w *by* s	2.55	3.31	4.08	4.47	5.31						
Weſt	6.00										
⊙ ſet.	6.00	5.58	5.56	5.54	5.52	5.50	5.48	5.46	5.44	5.42	5.41

A Sun Dial for the Latitude of 12 *Degrees.*

North Declination.

Deg.	2 d	5 d	7 d	10 d		12 d	15 d	17 d	20 d	22 d	23 d
Min.	30m		30m			30m		30m			30m
Point.	h m	h m	h m	h m	Point.	h m	h m	h m	h m	h m	h m
South	12	12	12	12	North	12	12	12	12	12	12
s *by* w	0.07	0.06	0.04	0.02	n *by* w	0.00	0.02	0.04	0.07	0.09	0.10
s s w	0.16	0.12	0.08	0.04	n n w	0.01	0.05	0.10	0.14	0.18	0.21
s w*by*s	0.25	0.19	0.12	0.05	nw *b* n	0.01	0.08	0.15	0.23	0.29	0.34
s w	0.37	0.28	0.18	0.08	n w	0.02	0.12	0.23	0.35	0.44	0.51
s w*b*w	0.55	0.41	0.27	0.12	nw*b* w	0.03	0.19	0.33	0.47	1.09	1.21
w s w	1.25	1.04	0.42	0.19	w n w	0.05	0.31	1.00	1.14	2.07	2.40
w *by* s	2.31	1.56	1.23	0.38	w *by* n	0.09	1.17				
Weſt	5.13	4.23	3.27	2.16							
☉ ſet.	6.02	6.04	6.06	6.09	☉ ſet.	6.11	6.13	6.15	6.18	6.20	6.22
Sun's	d.m.	d.m.	d.m.	d.m.	Sun's	d.m.	d.m.	d. m.	d.m.	dm	d m.
Amp.	2.33	5.07	7.39	10.13	Amp.	12.46	15.20	17.55	20.28	22.31	24.5

South Declination.

Deg	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.09	0.11	0.13	0.15	0.17	0.19	0.21	0.23	0.25	0 27	0.29
s s w	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.49	0.53	0.57	1.00
s w*by*s	0.32	0.38	0.45	0.51	0.58	1.05	1.12	1.19	1.26	1.32	1.37
s w	0.47	0.56	1.06	1.16	1.26	1.36	1.46	1.57	2.08	2.18	2.25
sw*b* w	1.09	1.23	1.37	1.52	2.06	2.21	2.37	2.51	3.11	3.27	3.39
w s w	1.47	2.07	2.29	2.51	3.14	3.38	4.04	4.33	5.07	5.41	
w *by* s	3.05	3.39	4.18	4.51	5.32						
Weſt	5.00										
☉ ſet.	6.00	5.58	5.56	5.54	5.51	5.49	5.47	5.45	5.42	5.40	5.38

A Sun-Dial for the Latitude of 13 *Degrees.*

North Declination.

Deg Min	2 d 30m	5 d	7 d 30m	10 d	12 d 30m
Point.	h m	h m	h m	h m	h m
South	12	12	12	12	12
s *by* w	0.08	0.06	0.04	0.02	0.00
s s w	0.17	0.13	0.09	0.05	0.01
s w *by* s	0.28	0.21	0.15	0.08	0.01
s w	0.41	0.32	0.22	0.12	0.02
s w *b* w	1.01	0.47	0.32	0.18	0.03
w s w	1.33	1.12	0.51	0.28	0.05
w *by* s	2.41	2.08	1.29	0.54	0.10
Weſt.	5.16	4.31	3.39	2.41	1.05
⊙ ſet	6.02	6.05	5.07	6.09	6.11
Sun's Amp.	d.m. 2.33	d.m. 5.08	d.m. 7.42	d.m. 10.16	d.m. 12.49

	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m
North	12	12	12	12	12
n *by* w	0.02	0.04	0.06	0.08	0.09
n n w	0.03	0.08	0.12	0.10	0.15
n w *b* n	0.06	0.13	0.21	0.27	0.31
n w	0.08	0.17	0.30	0.40	0.47
n w *b* w	0.13	0.29	0.46	1.01	1.13
w n w	0.21	0.49	1.21	1.52	2.22
w *by* n	0.48				
⊙ ſet.	6.14	6.16	6.19	6.21	6.23
Sun's Amp.	d.m. 15.24	d.m. 17.59	d.m. 20.33	d.m. 22.37	d.m. 24.11

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.10	0.12	0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.28	0.29
ss w	0.21	0.25	0.29	0.33	0.38	0.42	0.46	0.50	0.55	0.59	1.02
s w *by* s	0.34	0.41	0.47	0.54	1.00	1.07	1.14	1.20	1.28	1.34	1.39
s w	0.51	1.00	1.10	1.19	1.29	1.39	1.50	2.01	2.12	2.21	2.29
s w *b* w	1.14	1.28	1.42	1.56	2.11	2.26	2.41	2.58	3.15	3.30	3.42
w s w	1.54	2.15	2.36	2.57	3.20	3.43	4.09	4.37	5.09	5.40	
w *by* s	3.14	3.47	4.20	4.55	5.34						
Weſt	6.00										
⊙ ſet.	6.00	5.58	5.55	5.53	5.51	5.49	5.46	5.44	5.41	5.39	5.37

A Sun Dial for the Latitude of 14 *Degrees.*

North Declination.

Deg. Min.	2 d 30m	5 d	7 d 30m	10 d	12 d 30m		15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	Point.	h m	h m	h m	h m	h m
South	12	12	12	12	12	North	12	12	12	12	12
s *by* w	0.09	0.07	0.05	0.03	0.01	n *by* w	0.01	0.03	0.05	0.07	0.08
s s w	0.19	0.15	0.11	0.07	0.03	n n w	0.02	0.06	0.10	0.14	0.17
s w*by*s	0.30	0.24	0.17	0.11	0.04	nw *b* n	0.03	0.10	0.17	0.22	0.28
s w	0.45	0.35	0.26	0.16	0.06	n w	0.04	0.15	0.26	0.35	0.43
s w*b*w	1.06	0.52	0.38	0.24	0.09	nw*b* w	0.06	0.22	0.40	0.54	1.06
w s w	1.41	1.20	0.59	0.38	0.15	w n w	0.10	0.37	1.08	1.38	2.05
w *by* s	2.52	2.19	1.46	1.10	0.29	w *by* n	0.22	1.48			
Weſt	5.20	4.38	3.52	3.00	1.49						
⊙ ſet.	6.02	6.05	6.07	6.10	6.12	⊙ ſet.	6.15	6.18	6.21	6.23	6.25
Sun's Amp.	d.m. 2.34	d.m. 5.09	d.m. 7.44	d.m. 10.19	d.m. 12.53	Sun's Amp.	d.m. 15.28	d.m. 18.3	d.m. 20.38	d.m. 22.43	d m. 24.17

South Declination.

Deg Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.11	0.13	0.15	0.17	0.19	0.21	0.23	0.25	0.27	0.29	0.30
s s w	0.23	0.27	0.31	0.35	0.40	0.44	0.48	0.53	0.57	1.01	1.04
s w*by*s	0.37	0.43	0.50	0.56	1.03	1.10	1.16	1.23	1.31	1.36	1.42
s w	0.54	1.04	1.13	1.23	1.33	1.43	1.53	2.04	2.15	2.24	2.31
sw*b* w	1.20	1.33	1.47	2.01	2.15	2.30	2.45	3.02	3.19	3.33	3.45
w s w	2.01	2.21	2.42	3.03	3.25	3.48	4.12	4.40	5.11	5.40	
w *by* s	3.22	3.53	4.25	4.59	5.35						
Weſt	6.00										
⊙ ſet	6.00	5.58	5.55	5.53	5.50	5.48	5.45	5.42	5.39	5.37	5.35

A Sun-Dial for the Latitude of 15 Degrees.

North Declination.

Deg. Min.	2 d 30m	5 d	7 d 30m	10 d	12 d 30m		15 d	17 d 30m	20 d	22d	23 d 30m
Point.	h m	h m	h m	h m	h m	Point	h m	h m	h m	h m	h m
South	12	12	12	12	12	North	12	12	12	12	12
s *by* w	0.10	0.08	0.06	0.04	0.02	n *by* w	Zen. Weſt.	0.02	0.04	0.06	0.07
s s w	0.21	0.16	0.12	0.08	0.04	n n w		0.04	0.09	0.12	0.15
sw *by* s	0.33	0.26	0.20	0.13	0.07	nw *by* n		0.07	0.14	0.20	0.25
s w	0.49	0.39	0.30	0.20	0.10	n w		0.11	0.22	0.31	0.38
s w*b*w	1.11	0.58	0.44	0.37	0.15	nw*b* w		0.16	0.33	0.47	0.59
w s w	1.40	1.28	1.08	0.47	0.24	w n w		0.26	0.56	1.24	1.50
w *by* s	3.00	2.30	1.58	1.24	0.46	w *by* n		1.06			
Weſt.	5.22	4.44	4.02	3.15	2.17						
⊙ ſet.	6.02	6.05	6.08	6.11	6.13	⊙ ſet.	6.16	6.19	6.22	6.25	6.27
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	Sun's	d.m.	d.m.	d.m.	d.m.	d m.
Amp	2.35	5.10	7.46	10.21	12.56	Amp.	15.32	18.8	20.44	22.49	24.24

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.12	0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.28	0.30	0.31
s s w	0.24	0.28	0.32	0.36	0.40	0.45	0.49	0.53	0.58	1.01	1.04
sw *by* s	0.39	0.46	0.52	0.59	1.05	1.12	1.18	1.25	1.33	1.39	1.43
s w	0.58	1.07	1.17	1.26	1.36	1.46	1.56	2.07	2.18	2.27	2.34
s w*b*w	1.25	1.38	1.52	2.06	2.20	2.34	2.49	3.05	3.22	3.37	3.48
w s w	2.08	2.28	2.48	3.08	3.29	3.52	4.16	4.42	5.12	5.40	
w *by* s	3.30	4.00	4.30	5.02	5.36						
Weſt.	6.00										
⊙ ſet.	6.00	5.58	5.55	5.52	5.49	5.47	5.44	5.41	5.38	5.35	5.33

A Sun-Dial for the Latitude of 16 Degrees.

North Declination.

Deg. Min.	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d		17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	Point.	h m	h m	h m	h m
South	12	12	12	12	12	12	North	12	12	12	12
s *by* w	0.11	0.09	0.07	0.05	0.03	0.01	n *by* w	0.01	0.03	0.05	0.07
s s w	0.22	0.18	0.14	0.10	0.06	0.02	n n w	0.03	0.07	0.11	0.14
s w*by*s	0.35	0.29	0.23	0.16	0.10	0.03	nw *b* n	0.04	0.09	0.17	0.22
s w	0.52	0.43	0.34	0.25	0.14	0.04	n w	0.06	0.17	0.26	0.33
sw *b*w	1.16	1.03	0.49	0.35	0.21	0.06	nw*b* w	0.10	0.26	0.40	0.52
w s w	1.55	1.36	1.16	0.55	0.33	0.10	w n w	0.16	0.44	1.11	1.34
w *by* s	3.08	2.39	2.09	1.37	1.01	0.20	w *by* n	0.36			
Weſt.	5.25	4.49	4.11	3.28	2.37	1.23	Weſt.				
☉ ſet	6.03	6.06	6.09	6.12	6.15	6.18	☉ ſet.	6.21	6.24	6.27	5.29
Sun's Amp.	d.m. 2.35	d.m. 5 12	d.m. 7.48	d.m. 10.24	d.m. 13.00	d.m. 15.37	Sun's Amp.	d.m. 18.13	d.m. 20.51	d.m. 22.56	d.m. 24.32

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.13	0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.28	0.30	0.32
s s w	0.26	0.30	0.34	0.38	0.42	0.46	0.50	0.55	0.59	1.03	1.06
s w*by*s	0.42	0.48	0.54	1.01	1.07	1.14	1.21	1.28	1.35	1.41	1.46
s w	1.02	1.11	1.20	1.20	1.39	1.49	1.59	2.10	2.21	2.30	2.37
s w*b*w	1.30	1.43	1.56	2.10	2.24	2.38	2.53	3.09	3:25	3.40	3.51
w s w	2.15	2.34	2.54	3.14	3.34	3.56	4.19	4.45	5.13	5.40	
w *by* s	3.37	4.05	4.34	5.04	5.36						
W eſt.	6.00										
☉ ſet.	6.00	5.57	5.54	5.51	5.48	5.45	5.42	5.39	5.36	5.33	5.31

A Sun Dial for the Latitude of 17 *Degrees.*

North Declination.

Deg. Min.	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d		17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	Point	h m	h m	h m	h m
South	12	12	12	12	12	12	North	12	12	12	12
s *by* w	0.11	0.09	0.07	0.06	0.04	0.02	n *by* w	0.00	0.02	0.04	0.06
s s w	0.24	0.20	0.16	0.12	0.08	0.03	n n w	0.01	0.05	0.09	0.12
sw*by* s	0.38	0.32	0.25	0.19	0.13	0.06	n w *b*n	0.01	0.08	0.15	0.19
s w	0.56	0.47	0.38	0.28	0.19	0.08	n w	0.02	0.13	0.22	0.29
s w*b*w	1.21	1.08	0.55	0.41	0.27	0.12	n w*b*w	0.03	0.19	0.33	0.45
w s w	2.02	1.43	1.23	1.03	0.42	0.19	w n w	0.05	0.33	0.58	1.20
w *by* s	3.16	2.48	2.20	1.49	1.16	0.37	w *by* n	0.11	1.36		
Weſt.	5.27	4.53	4.18	3.39	2.54	1.55					
w *by* n					5.50	5.11					
⊙ ſet	6.03	5.06	6.09	6.12	6.15	6.19	⊙ ſet.	6.22	6.25	6.28	6.31
Sun's Amp.	d.m. 2.36	d.m. 5.13	d.m. 7.50	d.m. 10.28	d.m. 13.37	d.m. 25.42	Sun's Amp.	d.m. 18.19	d.m. 20.57	d.m. 23.4	d.m. 24.40

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20d	22 d	23 d 30m
Poin	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s*by* w	0.13	0.15	0.17	0.19	0.21	0.23	0.25	0.27	0.29	0.31	0.33
s s w	0.28	0.32	0.36	0.39	0.43	0.47	0.52	0.56	1.01	1.04	1.07
sw*by*s	0.44	0.50	0.57	1.03	1.09	1.16	1.23	1.30	1.37	1.43	1.47
s w	1.05	1.14	1.24	1.33	1.42	1.51	2.06	2.13	2.2[illegible]	2.32	2.39
sw*b*w	1.35	1.48	2.01	2.14	2.28	2.42	2.57	3.12	3.25	3.42	3.54
w s w	2.21	2.40	2.59	3.18	3.39	4.00	4.22	4.47	5.14	5.39	
w *by* s	3.43	4.10	4.38	5.07	5.37						
Weſt	6.00										
⊙ ſet.	6.00	5.57	5.54	5.51	5.48	5.45	5.41	5.38	5.35	5.32	5.29

A Sun-Dial for the Latitude of 18 *Degrees.*

North Declination.

Deg.	2 d	5 d	7 d	10 d	12 d	15 d	17 d		20 d	22 d	23 d
Min.	30m		30m		30m		30m				30m
Point	h m	h m	h m	h m	h m	h m	h m	Point.	h m	h m	h m
South	12	12	12	12	12	12	12	North	12	12	12
s *by* w	0.12	0.10	0.08	0.06	0.04	0.02	0.00	n *by* w	0.02	0.03	0.05
s s w	0.25	0.21	0.17	0.13	0.09	0.05	0.01	n n w	0.04	0.07	0.10
s w*by*s	0.40	0.34	0.28	0.21	0.15	0.09	0.01	nw *b* n	0.06	0.12	0.16
s w	1.00	0.50	0.41	0.32	0.22	0.12	0.02	n w	0.09	0.17	0.24
sw *b*w	1.26	1.13	1.00	0.47	0.34	0.18	0.03	nw*b* w	0.13	0.27	0.38
w s w	2.08	1.50	1.31	1.11	0.51	0.29	0.05	w n w	0.21	0.45	1.06
w *by* s	3.23	2.57	2.29	2.00	1.29	0.53	0.10	w *by* n	0.53		
Weſt.	5.29	4.57	4.24	3.49	3.08	2.18	0.56				
w *by*n					5.51	5.15	4.32				
⊙ ſet.	6.02	6.06	6.09	5.13	6.16	6.20	6.23	⊙ ſet.	6.27	6.30	6.33
Sun's	d.m.	d.m.	d.m	d.m.	d.m.	d.m.	d.m.	Sun's.	d.m.	d.m.	d.m.
Amp.	2.37	5 15	7.53	10.31	13.9	15.47	18.26	Amp	21.43	1 2	24 48

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.28	0.30	0.32	0.33
s s w	0.29	0.33	0.37	0.41	0.45	0.49	0.53	0.58	1.02	1.06	1.08
s w*bys*	0.47	0.53	0.59	1.05	1.12	1.18	1.25	1.32	1.39	1.45	1.50
s w	1.09	1.18	1.27	1.36	1.46	1.55	2.05	2.15	2.26	2.35	2.42
s w*b*w	1.39	1.52	2.05	2.18	2.32	2.44	3.00	3.15	3.31	3.45	3.56
w s w	2.27	2.45	3.04	3.23	3.43	4.03	4.25	4.49	5.15	5.39	
w *by* s	3.49	4.15	4.41	5.09	5.38						
Weſt.	6.00										
⊙ ſet.	6.00	5.58	5.54	5.51	5.47	5.44	5.40	5.37	5.33	5.30	5.27

A Sun-Dial for the Latitude of 19 Degrees.

North Declination.

Deg.	2 d	5 d	7 d	10 d	12 d	15 d	17 d		20 d	22 d	23 d
Min.	30m		30m		30m		30m				30m
Point	h m	h m	h m	h m	h m	h m	h m	Point.	h m	h m	h m
South	12	12	12	12	12	12	12	North	12	12	12
s *by* w	0.13	0.11	0.09	0.07	0.05	0.03	0.01	n *by* w	0.01	0.03	0.04
s s w	0.27	0.23	0.19	0.15	0.11	0.07	0.03	n n w	0.02	0.05	0.08
s w*by*s	0.43	0.37	0.30	0.24	0.18	0.11	0.05	nw*by*n	0.03	0.09	0.13
s w	1.03	0.55	0.45	0.36	0.27	0.17	0.07	n w	0.04	0.13	0.20
sw*b*w	1.35	1.18	1.05	0.52	0.38	0.24	0.09	nw*b*w	0.06	0.20	0.31
w s w	2.15	1.57	1.38	1.19	0.59	0.41	0.15	w n w	0.10	0.33	0.53
w *by* s	3.29	3.04	2.38	2.09	1.41	1.08	0.29	w *by* n	0.23		
Weſt	5.31	5.01	4.30	3.57	3.20	2.36	1.35				
w*by* n					5.52	5.17	4.40				
☉ ſet.	6.03	6.07	6.10	6.14	6.17	6.21	6.24	☉ ſet.	6.28	6.31	6.34
Sun's	d.m.	d.m.	d.m.	d.m.	d.m	d.m.	d.m.	Snn's	d.m.	d.m.	d.m.
Amp.	2.38	5.17	7.56	10.35	13.14	25.53	18.33	Amp.	21.12	23.20	24.58

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.15	0.17	0.19	0.21	0.23	0.25	0.27	0.29	0.31	0.32	0.34
s s w	0.31	0.35	0.38	0.42	0.45	0.50	0.54	0.58	1.03	1.07	1.09
s w*by*s	0.49	0.55	1.01	1.08	1.14	1.23	1.27	1.33	1.41	1.47	1.51
s w	1.12	1.21	1.30	1.39	1.48	1.58	1.07	2.16	2.29	2.37	2.44
s w*b*w	1.44	1.57	2.09	2.23	2.36	2.45	3.04	3.19	3.34	3.48	3.58
w s w	2.33	2.51	3.09	3.27	3.46	4.06	4.25	4.51	5.16	5.39	
w *by* s	4.54	4.19	4.44	5.10	5.39						
Weſt.	6.00										
☉ ſet	6.00	5.57	5.53	5.50	5.46	5.43	5.39	5.36	5.32	5.29	5.26

A Sun-Dial for the Latitude of 20 *Degrees.*

North Declination.

Deg. Min.	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m		20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	Point.	h m	h m	h m
South	12	12	12	12	12	12	12	North	12	12	12
s *by* w	0.14	0.12	0.10	0.08	0.06	0.04	0.02	n *by* w	Zen. West.	0.02	0.03
s s w	0.28	0.25	0.21	0.17	0.13	0.09	0.05	n n w		0.04	0.06
sw *by* s	0.45	0.39	0.33	0.23	0.20	0.14	0.07	nw *by* n		0.06	0.10
s w	1.07	0.58	0.49	0.40	0.30	0.21	0.11	n w		0.09	0.16
sw*b*w	1.36	1.23	1.10	0.58	0.44	0.30	0.15	n w*b*w		0.13	0.24
w s w	2.21	2.03	1.45	1.26	1.07	0.46	0.24	w n w		0.22	0.40
w *by* s	3.37	3.11	2.45	2.20	1.52	1.21	0.45	w *by* n			
Weſt	5.32	5.04	4.35	4.00	3.30	2.50	2.00				
w *by* n					5.54	5.23	4.47				
⊙ ſet.	6.03	6.07	6.11	6.15	6.18	6.22	6.26	⊙ ſet.	6.30	6.33	6.36
Sun's Amp.	d.m. 2.40	d.m. 5.20	d.m. 7.59	d.m. 10.39	d.m. 13.19	d.m. 16.0	d.m. 18.40	Sun's Amp.	d.m. 21.20	d.m. 23.29	d.m. 25.8

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.16	0.17	0.19	0.21	0.23	0.25	0.27	0.29	0.31	0.33	0.34
s s w	0.32	0.36	0.40	0.44	0.48	0.52	0.56	1.00	1.05	1.08	1.11
sw*by*s	0.51	0.58	1.04	1.10	1.12	1.23	1.29	1.36	1.43	1.49	1.53
s w	1.16	1.24	1.33	1.42	1.51	2.01	2.10	2.20	2.31	2.40	2.47
s w*b*w	1.48	2.01	2.14	2.26	2.39	2.53	3.07	3.25	3.37	3.56	4.00
w s w	2.38	2.56	3.13	3.31	3.50	4.09	4.30	4.52	5.16	5.38	
w *by* s	3.59	4.23	4.47	5.12	5.38						
Weſt	6.00										
⊙ ſet.	6.00	5.57	5.53	5.49	5.45	5.42	5.38	5.34	5.30	5.27	5.24

A Sun-Dial for the Latitude of 21 *Degrees.*

North Declination.

Deg. Min.	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d		22 d	23 d 30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	Point.	h m	h m
South	12	12	12	12	12	12	12	12	North	12	12
s *by* w	0.14	0.13	0.11	0.09	0.07	0.05	0.03	0.01	n *by* w	0.01	0.02
s s w	0.30	0.26	0.22	0.18	0.14	0.10	0.06	0.02	n n w	0.02	0.04
s w*by*s	0.48	0.42	0.35	0.29	0.23	0.16	0.10	0.03	nw*by*n	0.03	0.07
s w	1.10	1.01	0.52	0.43	0.34	0.26	0.15	0.04	n w	0.04	0.11
sw*b*w	1.40	1.27	1.16	1.03	0.49	0.36	0.21	0.06	nw*b*w	0.06	0.17
w s w	2.26	2.05	1.52	1.29	1.15	0.55	0.39	0.10	w n w	0.11	0.40
w *by* s	3.41	3.18	2.54	2.29	2.03	1.33	1.00	0.20	w *by* n	0.24	
Weſt	5.34	5.07	4.40	4.11	3.39	3.03	2.19	4.14			
w*by* n					5.55	5.26	4.53	4.12			
☉ ſet.	5.04	6.08	6.12	6.16	6.20	6.25	6.28	6.32	☉ ſet.	6.35	6.38
Sun's Amp.	d.m. 2.41	d.m. 5.21	d.m. 8.02	d.m. 10.43	d.m 13.24	d.m. 16.6	d.m. 18.47	d.m. 21.29	Sun's Amp.	d.m. 23.40	d.m. 25.18

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.16	0.18	0.20	0.22	0.24	0.26	0.28	0.30	0.32	0.34	0.3
s s w	0.34	0.38	0.42	0.45	0.49	0.54	0.58	1.02	1.06	1.10	1.11
s w*by*s	0.54	1.01	1.06	1.12	1.19	1.25	1.32	1.38	1.45	1.51	1.5
s w	1.19	1.28	1.37	1.46	1.55	2.04	2.13	2.23	2.33	2.42	2.45
s w*b*w	1.53	2.05	2.18	2.30	2.43	2.56	3.10	3.24	3.39	3.52	4.0
w s w	2.43	3.01	3.18	3.35	3.54	4.12	4.32	4.53	5.17		
w *by* s	4.04	4.27	4.50	5.14	5.39						
Weſt.	6.00										
☉ ſet	6.00	5.56	5.52	5.48	5.44	5.40	5.35	5.32	5.28	5.25	5.2

A Sun-Dial for the Latitude of 22 Degrees.

North Declination.

Deg.	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d		22 d	23
Min.	30m		30m		30m		30m				30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	Point.	h m	h
South	12	12	12	12	12	12	12	12	North	12	
s *by* w	0.15	0.13	0.11	0.09	0.08	0.06	0.04	0.02	n *by* w	Zen. Weſt.	0.01
s s w	0.31	0.28	0.24	0.20	0.16	0.12	0.08	0.04	n n w		0.0
sw *by*s	0.50	0.44	0.42	0.32	0.25	0.19	0.13	0.06	nw*by*n		0.04
s w	1.14	1.05	0.56	0.47	0.38	0.29	0.19	0.08	n w		0.07
sw*b*w	1.45	1.33	1.20	1.08	0.55	0.41	0.27	0.13	n w*b*w		0.10
w s w	2.30	2.15	1.58	1.40	1.22	1.03	0.42	0.20	w n w		0.17
w *by* s	3.46	3.24	3.01	2.39	2.12	1.45	1.14	0.37			
Weſt	5.35	5.10	4.44	4.17	3.47	3.14	2.35	1.43			
w *by* n					5.56	5.28	4.58	4.21			
☉ ſet.	6.04	6.08	6.12	5.16	6.20	6.25	6.29	6.34	☉ ſet.	6.37	6.40
Sun's	d.m.	d.m.	d.m	d.m.	d.m.	d.m.	d.m.	d.m.	Sun's	d.m.	d.m
Amp.	2.42	5.23	8.05	10.48	13.30	16.13	18.55	21.39	Amp.	23.50	25.2

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.17	0.19	0.21	0.23	0.25	0.27	0.28	0.30	0.32	0.34	0.35
s s w	0.35	0.39	0.43	0.47	0.51	0.55	0.59	1.03	1.07	1.11	1.13
sw*by*s	0.56	1.02	1.08	1.14	1.21	1.27	1.33	1.40	1.47	1.52	1.57
s w	1.22	1.31	1.40	1.49	1.58	2.07	2.16	2.25	2.36	2.44	2.51
s w*b*w	1.57	2.09	2.21	2.34	2.46	2.59	3.13	3.27	3.42	3.54	4.04
w s w	2.49	3.05	3.22	3.39	3.57	4.15	4.34	4.55	5.17		
w *by* s	4.08	4.30	4.52	5.15	5.39						
Weſt	6.00										
☉ ſet.	6.00	5.56	5.52	5.48	5.44	5.40	5.35	5.31	5.26	5.23	5.20

A Sun Dial for the Latitude of 23 Degrees.

North Declination.

Deg.	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d		23 d
Min.	30m		30m		30m		30m				30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	Point	h m
South	12	12	12	12	12	12	12	12	12	Noth	12
s *by* w	0.16	0.15	0.13	0.11	0.09	0.07	0.05	0.03	0.01	n *by* w	0.00
s s w	0.33	0.30	0.26	0.22	0.18	0.14	0.10	0.05	0.02	n n w	0.01
sw*by* s	0.53	0.47	0.41	0.34	0.28	0.22	0.16	0.09	0.03	nw*b* n	0.01
s w	1.17	1.08	1.00	0.50	0.41	0.32	0.22	0.13	0.04	n w	0.02
sw*b*w	1.49	1.37	1.25	1.13	1.00	0.47	0.33	0.19	0.06	nw*b*w	0.03
w s w	2.37	2.21	2.04	1.47	1.29	1.11	0.51	0.29	0.10	w n w	0.06
w *by* s	3.51	3.30	3.08	2.45	2.21	1.55	1.26	0.59	0.20		
Weſt.	5.36	5.12	4.48	4.22	3.54	3.23	2.48	2.04	1.11		
w *by* n				6.21	5.57	5.31	5.02	4.29	3.56		
⊙ ſet	6.04	6.09	6.13	6.17	6.22	6.26	6.31	6.36	6.39	⊙ ſet	6.43
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	Sun's	d.m.
Amp.	2.43	5.26	8.10	10.52	13.36	16.20	19.4	21.49	24.11	Amp.	25.41

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
by w	0.18	0.20	0.22	0.24	0.26	0.28	0.30	0.32	0.34	0.35	0.36
s sw	0.37	0.41	0.44	0.48	0.51	0.55	0.59	1.03	1.08	1.12	1.15
sw*by*s	0.59	1.04	1.10	1.16	1.23	1.29	1.35	1.41	1.49	1.54	1.59
s w	1.25	1.34	1.43	1.51	2.00	2.10	2.19	2.25	2.39	2.46	2.53
sw*b*w	2.01	2.13	2.25	2.37	2.50	3.02	3.16	3.29	3.44	3.56	4.06
w s w	2.53	3.10	3.26	3.43	4.00	4.17	4.36	4.56	5.17		
w *by* s	4.12	4.33	4.54	5.16	5.39						
Weſt.	6.00										
⊙ ſet.	6.00	5.56	5.51	5.47	5.43	5.38	5.34	5.29	5.24	5.21	5.17

A Sun-Dial for the Latitude of 24 *Degrees.*

North Declination.

Deg.	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.	30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	21	12	12	12	12	12	12	12
s *by* w	0.17	0.15	0.13	0.11	0.09	0.08	0.06	0.04	0.02	0.00
s s w	0.35	0.31	0.27	0.23	0.19	0.15	0.11	0.07	0.04	0.01
sw *by*s	0.55	0.49	0.43	0.37	0.30	0.24	0.18	0.11	0.06	0.01
s w	1.20	1.12	1.03	0.53	0.44	0.35	0.25	0.17	0.09	0.02
s w*b*w	1.54	1.42	1.30	1.18	1.05	0.52	0.39	0.21	0.13	0.03
w s w	2.42	2.26	2.10	1.53	1.36	1.18	0.59	0.38	0.20	0.05
w *by*s	3.56	3.35	3.14	2.52	2.29	2.05	1.34	1.07	0.33	0.10
Weſt.	5.37	5.15	4.51	4.27	4.01	3.32	3.00	2.21	1.39	0.49
w *by*n				6.21	5.58	5.33	5.06	4.35	4.06	3.39
w n w									6.24	6.09
☉ ſet	6.04	6.09	6.13	6.18	6.23	5.27	6.32	6.37	6.41	6.45
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	2.44	5.28	8.13	10.57	13.42	16.27	19.13	21.59	24.12	25.54

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.18	0.20	0.22	0.24	0.26	0.28	0.29	0.31	0.33	0.35	0.37
s s w	0.38	0.42	0.46	0.50	0.53	0.57	1.01	1.05	1.10	1.13	1.16
sw *by*s	1.01	1.07	1.13	1.19	1.25	1.31	1.37	1.44	1.50	1.56	2.00
s w	1.29	1.37	1.46	1.54	2.04	2.13	2.23	2.32	2.40	2.49	2.55
sw*b* w	2.05	2.17	2.29	2.41	2.53	3.05	3.18	3.32	3.46	3.58	4.08
w s w	2.58	3.14	3.30	3.46	4.02	4.20	4.38	4.57	5.18		
w *by* s	4.16	4.36	4.56	5.17	5.39						
Weſt.	6.00										
☉ ſet.	6.00	5.56	5.51	5.47	5.42	5.37	5.33	5.28	5.23	5.19	5.15

A Sun Dial for the Latitude of 25 *Degrees.*

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.19	0.17	0.16	0.14	0.12	0.10	0.08	0.06	0.04	0.02	0.01
s s w	0.40	0.36	0.32	0.29	0.25	0.21	0.17	0.13	0.09	0.05	0.03
sw*by* s	1.03	0.57	0.51	0.45	0.39	0.33	0.27	0.21	0.14	0.09	0.04
s w	1.32	1.23	1.15	1.06	0.57	0.49	0.40	0.31	0.21	0.13	0.06
sw*b*w	2.09	1.58	1.46	1.35	1.22	1.10	0.58	0.44	0.31	0.19	0.10
w s w	3.02	2.47	2.32	2.16	2.00	1.43	1.25	1.07	0.47	0.29	0.15
w *by* s	4.19	1.00	3.40	3.20	2.59	2.37	2.14	1.48	1.19	0.53	0.29
Weſt.	6.00	5.38	5.17	4.54	4.31	4.06	3.40	3.10	2.35	2.00	1.24
w *by* n					6.21	5.59	5.36	5.10	4.41	4.14	3.50
w n w										6.25	6.10
⊙ ſet	5.00	5.05	6.09	6.14	6.19	6.24	6.29	6.34	6.39	6.43	6.47
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp	0.00	2.45	5.31	8.16	11.3	13.49	16.35	19.22	22.10	24.25	26.7

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.19	0.21	0.23	0.25	0.27	0.28	0.30	0.32	0.34	0.36	0.38
s sw	0.40	0.43	0.47	0.51	0.55	0.59	1.02	1.06	1.11	1.14	1.17
sw*bys*	1.03	1.09	1.15	1.21	1.27	1.33	1.39	1.46	1.52	1.58	2.02
s w	1.32	1.40	1.48	1.57	2.06	2.14	2.23	2.33	2.42	2.50	2.57
sw*b*w	2.09	2.21	2.32	2.44	2.56	3.08	3.21	3.34	3.48	4.00	4.09
w s w	3.02	3.18	3.33	3.49	4.05	4.22	4.39	4.58	5.19		
w *by* s	4.19	4.39	4.58	5.18	5.39						
Weſt	6.00										
⊙ ſet	6.00	5.55	5.51	5.46	5.41	5.36	5.31	5.26	5.21	5.17	5.13

A Sun-Dial for the Latitude of 26 Degrees.

North Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.20	0.18	0.16	0.14	0.13	0.11	0.09	0.07	0.05	0.03	0.02
s s w	0.41	0.38	0.34	0.30	0.26	0.23	0.19	0.15	0.11	0.07	0.04
s w *by* s	1.05	0.59	0.54	0.48	0.42	0.36	0.30	0.24	0.17	0.11	0.07
s w	1.35	1.26	1.18	1.10	1.01	0.52	0.43	0.34	0.25	0.17	0.11
sw *b* w	2.13	2.02	1.50	1.39	1.27	1.15	1.03	0.50	0.36	0.25	0.16
w s w	3.07	2.52	2.37	2.21	2.06	1.49	1.32	1.14	0.55	0.38	0.25
w *by* s	4.22	4.04	3.45	3.25	3.06	2.45	2.18	1.58	1.31	1.07	0.45
West.	6.00	5.39	5.19	4.57	4.35	4.12	3.47	3.19	2.47	2.16	1.47
w *by* n					6.21	6.00	5.38	5.13	4.46	4.22	4.00
w n w									6.42	6.25	6.12
⊙ ſet.	6.00	6.05	6.10	6.15	6.20	6.25	6.30	6.35	6.41	6.45	6.49
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	2.46	5 34	8.20	11.8	13.56	16.44	19.33	22.22	24.38	26.22

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.20	0.22	0.24	0.25	0.27	0.29	0.31	0.33	0.35	0.36	0.38
s s w	0.41	0.45	0.49	0.52	0.56	1.00	1.04	1.08	1.12	1.15	1.18
s w *by* s	1.05	1.11	1.17	1.23	1.29	1.35	1.41	1.47	1.54	1.59	2.03
s w	1.35	1.43	1.51	2.00	2.08	2.17	2.26	2.35	2.44	2.52	2.59
s w *b* w	2.13	2.24	2.36	2.47	2.59	3.11	3.23	3.36	3.50	4.01	4.10
w s w	3.07	3.21	3.37	3.52	4.07	4.24	4.41	4.59	5.18		
w *by* s	4.22	4.41	5.00	5.19							
West.	6.00										
⊙ ſet.	6.00	5.55	5.50	5.45	5.40	5.35	5.30	5.25	95.1	5.15	5.11

A Sun Dial for the Latitude of 27 Degrees.

North Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.21	0.19	0.17	0.15	0.13	0.12	0.10	0.08	0.06	0.04	0.03
s s w	0.43	0.39	0.35	0.32	0.28	0.24	0.20	0.17	0.12	0.09	0.06
sw *by* s	1.07	1.02	0.56	0.50	0.45	0.39	0.33	0.27	0.20	0.13	0.10
s w	1.38	1.30	1.21	1.13	1.05	0.56	0.47	0.38	0.29	0.21	0.15
s w *b* w	2.17	2.06	1.55	1.43	1.32	1.20	1.08	0.55	0.42	0.32	0.23
w s w	3.10	2.56	2.41	2.26	2.11	1.55	1.39	1.22	1.03	0.47	0.34
w *by* s	4.25	4.07	3.49	3.31	3.11	2.51	2.30	2.07	1.42	1.19	0.59
Weſt.	6.00	5.40	5.21	5.00	4.39	4.17	3.53	3.27	2.58	2.30	2.05
w *by* n					6.21	6.01	5.39	5.17	4.51	4.28	4.09
w n w									6.42	6.26	6.13
☉ ſet	5.00	5.05	6.10	6.15	6.21	6.26	6.31	6.37	6.43	6.48	6.51
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m
Amp	0.00	2.48	5.36	8.25	11.14	14.3	16.53	19.43	22.34	24.52	26.37

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20d	22 d	23 d 30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.21	0.22	0.24	0.26	0.28	0.30	0.32	0.34	0.36	0.37	0.38
s sw	0.43	0.46	0.50	0.53	0.57	1.01	0.05	1.09	1.13	1.16	1.19
sw *by* s	1.07	1.13	1.19	1.25	1.30	1.36	1.42	1.48	1.55	2.02	2.05
s w	1.38	1.46	1.54	2.02	2.11	2.19	2.28	2.37	2.46	2.54	3.00
sw *b* w	2.17	2.28	2.39	2.50	3.02	3.13	3.26	3.38	3.52	4.01	4.10
w s w	3.10	3.25	3.40	3.54	4.10	4.25	4.42	4.59	5.18		
w *by* s	4.25	4.43	5.02	5.20	5.39						
Weſt	6.00										
☉ ſet	6.00	5.55	5.50	5.45	5.39	5.34	5.29	5.23	5.17	5.12	5.00

A Sun-Dial for the Latitude of 28 Degrees.

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.21	0.20	0.18	0.16	0.14	0.13	0.11	0.09	0.07	0.05	0.04
s s w	0.44	0.40	0.37	0.33	0.30	0.26	0.22	0.18	0.14	0.11	0.08
s w*by*s	1.10	1.04	0.58	0.53	0.47	0.41	0.35	0.29	0.22	0.16	0.13
s w	1.41	1.33	1.25	1.17	1.08	1.00	0.51	0.42	0.35	0.25	0.19
sw *b*w	2.20	2.10	1.59	1.48	1.36	1.25	1.13	1.05	0.48	0.37	0.28
w s w	3.14	3.00	2.46	2.31	2.17	2.01	1.45	1.29	1.11	0.55	0.43
w *by* s	4.28	4.11	3.53	3.39	3.17	3.00	2.38	2.16	1.52	1.31	1.13
Weſt.	6.00	5.41	5.22	5.04	4.43	4.21	3.59	3.35	3.07	2.42	2.20
w *by*n					6.21	6.04	5.41	5.21	4.56	4.34	4.10
w n w									6.42	6.27	6.14
☉ ſet.	6.00	6.05	6.11	6.16	6.22	5.27	6.33	6.39	5.45	6.50	6.53
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	2.50	5 40	8.30	11.21	14.11	17.3	19.56	22.48	25.6	26 52

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.21	0.23	0.25	0.27	0.28	0.30	0.32	0.34	0.36	0.38	0.39
s s w	0.44	0.48	0.51	0.55	0.58	1.02	1.06	1.10	1.14	1.17	1.20
s w*by*s	1.10	1.15	1.21	1.27	1.32	1.38	1.44	1.51	1.57	2.03	2.06
s w	1.41	1.49	1.57	2.05	2.13	2.21	2.30	2.39	2.47	2.56	3.02
s w*b*w	2.20	2.31	2.42	2.53	3.04	3.16	3.28	3.40	3.53	4.04	4.13
w s w	3.14	3.28	3.43	3.57	4.12	4.27	4.43	5.00	5.18		
w *by* s	4.28	4.45	5.03	5.21	5.39						
Weſt.	6.00										
☉ ſet.	6.00	5.55	5.49	5.44	5.38	5.33	5.27	5.21	5.15	5.10	5.07

A Sun-Dial for the Latitude of 29 Degrees.

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.22	0.20	0.19	0.17	0.15	0.13	0.11	0.10	0.08	0.06	0.05
s s w	0.45	0.42	0.38	0.35	0.31	0.27	0.23	0.19	0.16	0.12	0.10
sw *by*s	1.12	1.06	1.01	0.55	0.49	0.43	0.37	0.31	0.25	0.20	0.16
s w	1.43	1.36	1.28	1.20	1.12	1.03	0.55	0.46	0.37	0.29	0.23
sw*b*w	2.24	2.13	2.03	1.52	1.41	1.30	1.18	1.06	0.53	0.42	0.34
w s w	3.18	3.04	2.50	2.36	2.22	2.07	1.52	1.35	1.18	1.03	0.51
w *by* s	4.31	4.14	3.57	3.40	3.22	3.04	2.45	2.24	2.01	1.41	1.24
Weſt	6.00	5.42	5.24	5.05	4.46	4.26	4.04	3.41	3.16	2.53	2.33
w *by* n					6.21	6.02	5.43	5.22	5.00	4.40	4.23
w n w									6.42	6.27	6.15
⊙ ſet	6.00	6.06	6.11	6.17	6.23	6.28	6.34	6.40	6.47	6.52	6.56
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	2.51	5.43	8.34	11.27	14.19	17.12	20.8	24.32	25.22	27.8

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.22	0.24	0.26	0.27	0.29	0.31	0.33	0.35	0.37	0.38	0.39
s s w	0.45	0.49	0.53	0.56	1.00	1.04	1.08	1.11	1.15	1.18	1.21
sw *by*s	1.12	1.17	1.23	1.29	1.34	1.40	1.46	1.52	1.59	2.04	2.08
s w	1.43	1.51	1.59	2.07	2.15	2.24	2.32	2.41	2.50	2.58	3.04
s w*b*w	2.24	2.34	2.45	2.56	3.07	3.18	3.30	3.42	3.55	4.05	4.14
w s w	3.18	3.32	3.46	4.00	4.14	4.29	4.44	5.00			
w *by* s	4.31	4.48	5.04	5.22	5.39						
Weſt	6.00										
⊙ ſet	6.00	5.54	5.49	5.43	5.37	5.32	5.26	5.20	5.13	5.08	5.0

A Sun Dial for the Latitude of 30 *Degrees.*

North Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.23	0.21	0.19	0.18	0.16	0.14	0.12	0.10	0.08	0.07	0.06
s s w	0.47	0.43	0.40	0.36	0.33	0.29	0.25	0.21	0.17	0.14	0.12
s w*by*s	1.14	1.08	1.03	0.58	0.52	0.46	0.40	0.34	0.28	0.23	0.19
s w	1.46	1.38	1.31	1.23	1.15	1.07	0.58	0.50	0.41	0.33	0.27
s w*b*w	2.27	2.17	2.06	1.56	1.45	1.34	1.23	1.11	0.58	0.48	0.40
w s w	3.21	3.08	2.55	2.41	2.27	2.13	1.58	1.42	1.25	1.11	0.59
w *by* s	4.33	4.17	4.01	3.44	3.27	3.10	2.51	2.31	2.10	1.51	1.35
Weſt	6.00	5.43	5.25	5.07	4.49	4.30	4.09	3.48	3.24	3.02	2.44
w *by* n					6.21	6.03	5.45	5.25	5.03	4.45	4.29
w n w									6.42	6.28	6.17
⊙ ſet	6.00	6.06	6.12	6.18	6.23	6.29	6.36	6.42	6.48	6.54	6.59
Sun's	d.m.	d.m.	d.m.	d.m	d.m.	d.m.	d. m.	d. m	d.m.	d.m.	d. m.
Amp.	0.00	2.53	5.46	8.40	11.34	14.28	17.22	20.18	23.16	25.38	27.25

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.23	0.24	0.26	0.28	0.30	0.31	0.33	0.35	0.37	0 39	0.40
s s w	0.47	0.50	0.54	0.57	1.01	1.05	1.08	1.12	1.16	1.19	1.22
s w*by*s	1.14	1.19	1.25	1.30	1.36	1.42	1.48	1.54	2.00	2.05	2.09
s w	1.46	1.54	2.02	2.10	2.18	2.26	2.34	2.43	2.52	2.59	3.05
sw*b* w	2.27	2.38	2.48	2.58	3.09	3.20	3.32	3.43	3.56	4.06	4.14
w s w	3.21	3.35	3.48	4.01	4.16	4.30	4.45	5.01			
w *by* s	3.33	4.49	5.05	5.22	5.39						
Weſt	5.00										
⊙ ſet	5.00	5.54	5.48	5.42	5.37	5.31	5.24	5.18	5.12	5.06	5.01

A Sun-Dial for the Latitude of 31 *Degrees.*

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.23	0.22	0.20	0.18	0.17	0.15	0.13	0.11	0.09	0.08	0.07
s s w	0.48	0.45	0.41	0.38	0.34	0.31	0.27	0.23	0.19	0.16	0.13
sw *by* s	1.16	1.11	1.05	1.00	0.54	0.48	0.43	0.37	0.31	0.25	0.21
s w	1.49	1.41	1.34	1.26	1.18	1.10	1.02	0.53	0.45	0.37	0.32
sw*b*w	2.30	2.20	2.10	2.00	1.49	1.38	1.27	1.16	1.04	0.54	0.46
w s w	3.25	3.12	2.59	2.45	2.32	2.18	2.03	1.48	1.32	1.18	1.07
w *by* s	4.36	4.20	4.04	3.48	3.32	3.15	2.57	2.38	2.18	2.00	1.46
Weſt	6.00	5.43	5.26	5.09	4.52	4.33	4.14	3.53	3.31	3.11	2.55
w *by* n					6.21	6.04	5.46	5.27	5.07	4.49	4.35
w n w									6.43	6.29	6.18
☉ ſet	6.00	6.06	6.12	6.18	6.24	6.31	6.37	6.44	6.51	6.56	7.01
Sun's	d.m.	d.m.	d.m.	d.m	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	2.55	5.50	8.45	11.41	14.37	17.24	20.31	23.31	25.55	27.43

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.23	0.25	0.27	0.28	0.30	0.32	0.34	0.36	0.38	0.39	0.40
s s w	0.48	0.52	0.55	0.59	1.02	1.06	1.10	1.13	1.17	1.20	1.23
sw *by* s	1.16	1.21	1.27	1.32	1.38	1.44	1.49	1.55	2.01	2.07	2.11
s w	1.49	1.57	2.04	2.12	2.20	2.28	2.36	2.45	2.53	3.01	3.06
sw*b*w	2.30	2.41	2.51	3.01	3.12	3.23	3.34	3.45	3.57	4.07	4.15
w s w	3.25	3.38	3.51	4.04	4.18	4.32	4.46	5.01	5.17		
w *by* s	4.36	4.50	5.07	5.23							
Weſt	6.00										
☉ ſet	6.00	5.54	5.48	5.42	5.30	5.29	5.23	5.16	5.09	5.04	4.59

A Sun Dial for the Latitude of 32 Degrees.

North Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.24	0.22	0.21	0.19	0.17	0.16	0.14	0.12	0.10	0.09	0.07
s s w	0.50	0.46	0.43	0.39	0.36	0.32	0.29	0.25	0.21	0.18	0.15
s w*by*s	1.18	1.13	1.07	1.02	0.56	0.51	0.45	0.39	0.33	0.28	0.24
s w	1.52	1.44	1.37	1.29	1.22	1.14	1.05	0.56	0.48	0.41	0.36
s w*b*w	2.34	2.24	2.14	2.04	1.54	1.43	1.32	1.11	1.09	0.59	0.51
w s w	3.28	3.15	3.03	2.50	2.37	2.23	2.09	1.54	1.39	1.25	1.15
w *by* s	4.38	4.23	4.08	3.52	3.37	3.20	3.03	2.45	2.26	2.09	1.55
Weſt	6.00	5.44	5.28	5.11	4.55	4.37	4.21	3.59	3.38	3.19	3.04
w *by* n					6.22	6.05	5.48	5.30	5.10	4.53	4.39
w n w									6.43	6.30	6.19
☉ ſet	6.00	6.06	6.13	6.19	6.25	6.32	6.39	6.46	6.53	6.58	7.03
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d. m.	d. m.	d.m.	d m.
Amp.	0.00	2.57	5.54	8.51	11.48	14.47	17.46	19.47	22 47	26.43	28.3

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.34	0.26	0.27	0.29	0.31	0.33	0.34	0.36	0.38	0 40	0.41
s s w	0.50	0.53	0.56	1.00	1.03	1.07	1.10	1.14	1.18	1.21	1.24
s w*by*s	1.18	1.23	1.29	1.34	1.40	1.45	1.51	1.57	2.03	2.08	2.12
s w	1.52	1.59	2.07	2.14	2.22	2.30	2.38	2.45	2.51	3.02	3.08
s w*b* w	2.24	2.44	2.54	3.04	3.14	3.25	3.35	3.47	3.59	4.08	4.16
w s w	3.28	3.41	3.53	4.06	4.19	4.33	4.47	5.02			
w *by* s	4.38	4.53	5.08	5.53							
Weſt	6.00										
☉ ſet	5.00	5.54	5.47	5.41	5.35	5.28	5.21	5.14	5.07	5.02	4.57

A Sun-Dial for the Latitude of 33 *Degrees.*

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.25	0.23	0.21	0.20	0.18	0.16	0.15	0.13	0.11	0.09	0.08
s s w	0.51	0.47	0.44	0.41	0.37	0.34	0.30	0.27	0.23	0.19	0.17
s w*by*s	1.20	1.15	1.09	1.04	0.59	0.53	0.48	0.42	0.36	0.31	0.27
s w	1.54	1.47	1.40	1.32	1.24	1.17	1.09	1.01	0.53	0.46	0.41
sw*b*w	2.37	2.27	2.17	2.07	1.57	1.47	1.36	1.25	1.14	1.04	0.57
w s w	3.31	3.19	3.06	2.54	2.41	2.28	2.14	2.00	1.45	1.32	1.22
w *by* s	4.40	4.25	4.11	3.56	3.41	3.25	3.09	3.51	2.33	2.17	2.04
Weſt.	6.00	5.45	5.29	5.13	4.57	4.40	4.23	4.04	3.44	3.26	3.12
w *by* n					6.21	6.05	5.49	5.32	5.15	4.57	4.44
w n w									6.43	6.30	6.20
⊙ ſet.	6.00	6.07	6.13	6.20	6.26	6.33	6.40	6.47	6.55	7.01	7.06
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	2.59	5.58	8.57	11.57	14.57	17.58	21.1	24.24	26.31	28.24

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.25	0.26	0.28	0.30	0.31	0.33	0.35	0.37	0.39	0.40	0.41
s s w	0.51	0.54	0.58	1.01	1.05	1.08	1.12	1.15	1.19	1.22	1.25
s w*by*s	1.20	1.25	1.30	1.35	1.41	1.47	1.52	1.58	2.04	2.09	2.13
s w	1.54	2.02	2.09	2.17	2.24	2.32	2.40	2.48	2.58	3.05	3.10
s w*b*w	2.37	2.46	2.56	3.06	3.16	3.27	3.37	3.48	4.00	4.09	4.17
w s w	3.31	3.43	3.56	4.08	4.21	4.34	4.48	5.02			
w *by* s	4.40	4.54	5.09	5.24							
Weſt.	5.00										
⊙ ſet	6.00	5.53	5.47	5.40	5.34	5.27	5.20	5.13	5.05	4.59	4.54

A Sun-Dial for the Latitude of 34 *Degrees.*

North Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.25	0.24	0.22	0.20	0.19	0.17	0.15	0.14	0.12	0.10	0.09
s s w	0.52	0.49	0.45	0.42	0.39	0.35	0.32	0.28	0.24	0.21	0.19
sw *by* s	1.22	1.17	1.12	1.07	1.01	0.56	0.50	0.44	0.38	0.34	0.30
s w	1.57	1.50	1.42	1.35	1.28	1.20	1.12	1.04	0.56	0.40	0.43
s w *b* w	2.40	2.30	2.21	2.11	2.01	1.51	1.41	1.30	1.19	1.09	1.02
w s w	3.34	3.22	3.10	2.58	2.45	2.33	2.19	2.06	1.51	1.39	1.29
w *by* s	4.42	4.28	4.14	3.59	3.45	3.30	3.14	2.57	2.40	2.24	2.12
Weſt.	6.00	5.45	5.30	5.15	5.00	4.43	4.26	4.09	3.49	3.33	3.19
w *by* n					6.21	6.06	5.50	5.32	5.16	5.01	4.49
w n w									6.43	6.31	6.21
☉ ſet.	6.00	6.07	6.14	6.20	6.27	6.34	6.42	6.49	6.57	7.03	7.08
Sun's Amp.	d.m. 0.00	d.m. 3.01	d.m. 6.01	d.m. 9.03	d.m. 12.5	d.m. 15.8	d.m. 18.12	d.m. 21.16	d.m. 24.22	d.m. 26.52	d.m. 28.45

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.25	0.27	0.29	0.30	0.32	0.34	0.35	0.37	0.39	0.41	0.42
s s w	0.52	0.55	0.59	1.02	1.06	1.09	1.13	1.16	1.20	1.23	1.26
sw *by* s	1.22	1.27	1.32	1.38	1.43	1.48	1.54	2.00	2.05	2.10	2.14
s w	1.57	2.04	2.11	2.19	2.26	2.34	2.42	2.50	2.58	3.05	3.10
s w *b* w	2.40	2.49	2.59	3.09	3.18	3.28	3.39	3.50	4.01	4.10	4.18
w s w	3.34	3.46	3.58	4.10	4.22	4.35	4.48	5.02			
w *by* s	4.42	4.56	5.10	5.24							
Weſt.	6.00										
☉ ſet	6.00	5.53	5.46	5.40	5.33	5.26	5.18	5.11	5.03	4.57	4.52

A Sun-Dial for the Latitude of 35 Degrees.

North Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.26	0.24	0.21	0.23	0.19	0.18	0.16	0.14	0.13	0.11	0.10
s s w	0.53	0.50	0.47	0.44	0.40	0.37	0.33	0.30	0.26	0.23	0.20
s w*by*s	1.24	1.19	1.14	1.08	1.03	0.58	0.52	0.47	0.41	0.36	0.32
s w	1.59	1.52	1.45	1.38	1.31	1.23	1.15	1.08	0.59	0.53	0.47
sw*b*w	2.43	2.33	2.24	2.14	2.05	1.55	1.45	1.34	1.23	1.14	1.07
w s w	3.37	3.25	3.13	3.02	2.50	2.37	2.24	2.11	1.57	1.45	1.36
w *by* s	3.43	4.29	4.16	4.03	3.48	3.34	3.19	3.01	2.46	2.31	2.20
Weſt.	6.00	5.46	5.31	5.17	5.02	4.46	4.30	4.13	3.55	3.39	3.26
w *by*n					6.21	6.07	5.52	5.38	5.19	5.04	4.53
w n w									6.44	6.32	6.22
⊙ ſet.	6.00	6.07	6.14	6.21	6.28	6.35	6.43	6.51	6.59	7.06	7.11
Sun's Amp.	d.m. 0.00	d.m. 3.03	d.m. 6.06	d.m. 9.10	d.m. 12.14	d.m. 15.18	d.m. 18.25	d.m. 21.32	d.m. 24.4°	d.m. 27°12	d.m. 29.8

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.26	0.28	0.29	0.31	0.33	0.34	0.36	0.38	0.40	0.41	0.42
s s w	0.53	0.57	1.00	1.04	1.07	1.10	1.14	1.17	1.21	1.24	1.27
s w*by*s	1.24	1.29	1.34	1.39	1.45	1.50	1.55	2.01	2.07	2.12	2.15
s w	1.59	2.06	2.14	2.21	2.28	2.36	2.43	2.51	2.59	3.06	3.11
s w*b*w	2.43	2.52	3.01	3.11	3.20	3.30	3.40	3.51	4.02	4.11	4.18
w s w	3.37	3.48	4.00	4.12	4.24	4.36	4.49	5.02			
w *by* s	4.43	4.57	5.11	5.24							
Weſt.	6.00										
⊙ ſet	6.00	5.53	5.46	5.39	5.32	5.25	5.17	5.09	5.01	4.54	4.49

A Sun-Dial for the Latitude of 36 Degrees.

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.27	0.25	0.23	0.22	0.20	0.19	0.17	0.15	0.13	0.12	0.11
s s w	0.55	0.51	0.48	0.45	0.42	0.38	0.35	0.31	0.28	0.24	0.22
sw *by* s	1.26	1.21	1.16	1.11	1.05	1.00	0.55	0.49	0.44	0.39	0.35
s w	2.02	1.55	1.48	1.41	1.34	1.26	1.19	1.11	1.04	0.56	0.51
s w*b*w	2.45	2.36	2.27	2.18	2.08	1.59	1.49	1.39	1.28	1.19	1.12
w s w	3.39	3.28	3.17	3.05	2.53	2.41	2.29	2.16	2.03	1.51	1.42
w *by* s	4.45	4.32	4.19	4.06	3.52	3.38	3.23	3.08	2.52	2.38	2.27
Weſt.	6.00	5.46	5.32	5.18	5.04	4.49	4.33	4.17	4.00	3.45	3.33
w *by* n					6.22	6.08	5.53	5.38	5.22	5.08	4.57
w n w									6.44	6.33	6.24
☉ ſet.	6.00	6.07	6.15	6.22	6.29	6.37	6.45	6.53	7.08	7.03	7.14
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	3.06	6.11	9.17	12.24	15.31	18.40	21.49	25.0	27.35	29.32

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.27	0.28	0.30	0.31	0.33	0.35	0.36	0.38	0.40	0.41	0.43
s s w	0.55	0.58	1.01	1.05	1.08	1.11	1.15	1.18	1.22	1.25	1.27
sw *by* s	1.26	1.31	1.36	1.41	1.46	1.51	1.57	2.02	2.08	2.13	2.16
s w	2.02	2.09	2.16	2.23	2.30	2.37	2.45	2.53	3.01	3.07	3.12
s w*b*w	2.45	2.54	3.04	3.13	3.22	3.32	3.42	3.52	4.03	4.12	4.18
w s w	3.39	3.51	4.02	4.13	4.25	4.37	4.49	5.02			
w *by* s	4.45	4.58	5.11	5.25							
Weſt.	6.00										
☉ ſet	6.00	55.3	5.45	5.38	5.31	5.23	5.15	5.07	4.59	4.52	4.46

A Sun-Dial for the Latitude of 37 *Degrees.*

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.27	0.26	0.24	0.23	0.21	0.19	0.18	0.16	0.14	0.13	0.12
s s w	0.56	0.53	0.50	0.46	0.43	0.40	0.36	0.33	0.29	0.26	0.24
sw*by* s	1.28	1.23	1.18	1.13	1.08	1.02	0.57	0.52	0.47	0.41	0.38
s w	2.04	1.57	1.50	1.43	1.36	1.29	1.22	1.14	1.07	1.00	0.55
sw*b* w	2.48	2.39	2.30	2.21	2.12	2.03	1.53	1.43	1.33	1.24	1.17
w s w	3.42	3.31	3.20	3.09	2.57	2.46	2.34	2.21	2.08	1.57	1.48
w *by* s	4.47	4.34	4.21	4.09	3.56	3.42	3.28	3.13	2.58	2.45	2.34
Weſt.	6.00	5.47	5.33	5.19	5.06	4.52	4.37	4.21	4.05	3.50	3.39
w *by* n					6.22	6.08	5.54	5.40	5.24	5.11	5.00
w n w									6.44	6.33	6.25
⊙ ſet.	6.00	6.08	6.15	5.23	6.31	5.39	6.47	6.55	7.04	7.11	7.17
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	3.08	6.16	9.25	12.33	16.2	18.55	22.7	25.22	27.58	29.58

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.27	0.29	0.31	0.32	0.34	0.35	0.37	0.39	0.41	0.42	0.43
ss w	0.56	0.59	1.02	1.06	1.09	1.12	1.16	1.19	1.23	1.26	1.22
s w*by*s	1.28	1.33	1.37	1.42	1.47	1.53	1.58	2.04	2.09	2.14	2.17
s w	2.04	2.11	2.18	2.25	2.32	2.39	2.46	2.54	3.01	3.08	3.13
sw*b*w	2.48	2.57	3.06	3.15	3.24	3.33	3.43	3.53	4.03	4.12	4.19
w s w	3.42	3.53	4.04	4.15	4.26	4.38	4.50	5.03			
w *by* s	4.47	5.00	5.12	5.25							
Weſt	6.00										
⊙ ſet.	6.00	5.52	5.45	5.37	5.29	5.21	5.13	5.05	4.56	4.19	4.43

A Sun-Dial for the Latitude of 38 *Degrees.*

North Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.28	0.26	0.25	0.23	0.21	0.20	0.18	0.17	0.15	0.13	0.12
s s w	0.57	0.54	0.51	0.48	0.45	0.41	0.38	0.34	0.31	0.28	0.26
sw*by*s	1.29	1.24	1.20	1.15	1.10	1.05	1.00	0.54	0.49	0.44	0.41
s w	2.06	2.00	1.53	1.46	1.39	1.32	1.25	1.18	1.10	1.04	0.59
sw*b*w	2.51	2.42	2.33	2.24	2.15	2.06	1.57	1.47	1.37	1.29	1.12
w s w	3.44	3.34	3.23	3.12	3.01	2.50	2.39	2.26	2.13	2.03	1.54
w *by* s	4.48	4.36	4.24	4.12	4.01	3.46	3.33	3.18	3.03	2.50	2.40
Weſt.	6.00	5.47	5.34	5.21	5.08	4.54	4.41	4.25	4.09	3.55	3.45
w *by* n					6.22	6.09	5.56	5.41	5.26	5.14	5.04
w n w									5.45	6.34	6.26
☉ ſet	6.00	6.08	6.16	6.24	6.32	6.40	6.48	6.57	7.06	7.14	7.19
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	3.10	6.21	9.32	12.43	15.58	19.10	22.26	25.43	28.22	30.25

South Declination.

Deg. Min	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.28	0.30	0.31	0.33	0.34	0.36	0.38	0.39	0.41	0.42	0.44
s s w	0.57	1.00	1.04	1.07	1.10	1.13	1.16	1.20	1.24	1.27	1.29
sw *by*s	1.29	1.34	1.39	1.44	1.49	1.54	1.59	2.05	2.10	2.15	2.18
s w	2.06	2.13	2.20	2.27	2.34	2.41	2.48	3.55	3.03	3.09	3.14
sw*b*w	2.51	2.59	3.08	3.17	3.26	3.35	3.44	3.54	4.04	4.13	4.19
w s w	3.44	3.55	4.06	4.17	4.28	4.39	4.50	5.02			
w *by* s	4.48	5.00	5.13	5.25							
Weſt	6.00										
☉ ſet	6.00	5.52	5.44	5.36	5.28	5.20	5.12	5.03	4.54	4.46	4.41

A Sun-Dial for the Latitude of 39 *Degrees.*

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.29	0.27	0.25	0.24	0.22	0.21	0.19	0.17	0.16	0.14	0.13
s s w	0.58	0.55	0.52	0.49	0.46	0.43	0.39	0.36	0.32	0.30	0.27
s w *by* s	1.31	1.26	1.22	1.17	1.12	1.07	1.02	0.57	0.51	0.47	0.43
s w	2.09	2.02	1.55	1.49	1.42	1.35	1.28	1.21	1.13	1.07	1.02
s w *b* w	2.53	2.45	2.36	2.27	2.19	2.10	2.01	1.51	1.41	1.33	1.27
w s w	3.47	3.36	3.26	3.15	3.05	2.54	2.42	2.31	2.18	2.08	2.00
w *by* s	4.50	4.38	4.26	4.14	4.02	3.49	3.36	3.23	3.08	2.56	2.47
Weſt.	6.00	5.48	5.35	5.22	5.10	4.56	4.43	4.28	4.13	4.00	3.50
w *by* n					6.22	6.10	5.57	5.43	5.29	5.16	5.07
w n w									5.45	6.35	5.27
☉ ſet.	6.00	6.08	6.16	6.24	6.33	6.41	6.50	6.59	7.09	7.16	7.22
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	3.13	6.26	9.40	12.55	16.10	19.27	22.45	16.7	28.49	30.53

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.29	0.30	0.32	0.33	0.35	0.36	0.38	0.40	0.41	0.43	0.44
s s w	0.58	1.02	1.05	1.08	1.11	1.14	1.18	1.21	1.25	1.27	1.30
s w *by* s	1.31	1.36	1.41	1.46	1.51	1.56	2.01	2.06	2.11	2.16	2.19
s w	2.09	2.15	2.22	2.29	2.35	2.42	2.49	2.57	3.04	3.10	3.15
s w *b* w	2.53	3.02	3.10	3.19	3.27	3.36	3.46	3.55	4.05	4.13	4.20
w s w	3.47	3.57	4.08	4.18	4.29	4.39	4.51	5.03			
w *by* s	4.50	5.02	5.14	5.26							
Weſt	6.00										
☉ ſet.	6.00	5.52	5.44	5.36	5.27	5.19	5.10	5.01	4.51	4.44	4.38

A Sun-Dial for the Latitude of 40 Degrees.

North Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	21	12	12	12	12	12	12	12
s *by* w	0.29	0.28	0.26	0.24	0.23	0.21	0.20	0.18	0.17	0.15	0.14
s s w	1.00	0.57	0.53	0.50	0.47	0.44	0.41	0.37	0.34	0.31	0.29
sw*by*s	1.33	1.28	1.26	1.19	1.14	1.09	1.04	0.59	0.54	0.49	0.46
s w	2.11	2.04	1.58	1.51	1.45	1.38	1.31	1.24	1.17	1.11	1.06
sw*b*w	2.56	2.47	2.39	2.30	2.22	2.14	2.04	1.55	1.46	1.38	1.31
w s w	3.49	3.39	3.29	3.18	3.08	2.58	2.47	2.35	2.23	2.13	2.05
w *by* s	4.51	4.40	4.28	4.17	4.05	3.53	3.40	3.27	3.13	3.02	2.52
Weſt.	6.00	5.48	5.36	5.23	5.11	4.59	4.46	4.32	4.17	4.05	3.55
w *by* n					6.22	6.11	5.58	5.45	5.31	5.19	5.10
w n w								6.58	6.46	6.36	6.28
⊙ ſet	6.00	6.08	6.17	6.25	6.34	6.43	6.52	7.01	7.11	7.19	7.26
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	3.14	6.32	9.48	13.6	16.24	19.45	23.6	26.31	29.26	31.22

South Declination.

Deg. Min	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.29	0.31	0.32	0.34	0.35	0.37	0.38	0.40	0.42	0.43	0.44
s s w	1.00	1.03	1.06	1.09	1.12	1.15	1.18	1.22	1.25	1.28	1.30
sw *by*s	1.33	1.38	1.43	1.47	1.52	1.57	2.02	2.07	2.12	2.17	2.20
s w	2.11	2.17	2.24	2.31	2.37	2.44	2.51	2.58	3.05	3.11	3.16
sw*b*w	2.56	3.04	3.12	3.21	3.29	3.38	3.47	3.56	4.06	4.14	4.20
w s w	3.49	3.59	4.09	4.19	4.30	4.40	4.51				
w *by* s	4.51	5.03	5.14	5.26							
Weſt	6.00										
⊙ ſet.	6.00	5.52	5.13	5.35	5.26	5.17	5.08	4.59	4.49	4.41	4.34

A Sun-Dial for the Latitude of 41 *Degrees.*

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.30	0.28	0.27	0.25	0.24	0.22	0.21	0.19	0.17	0.16	0.15
s s w	1.01	0.58	0.55	0.52	0.49	0.46	0.42	0.39	0.36	0.33	0.31
sw*by* s	1.35	1.30	1.25	1.21	1.16	1.11	1.06	1.01	0.[illegible]6	0.52	0.48
s w	2.13	2.07	2.00	1.54	1.48	1.41	1.34	1.27	1.20	1.14	1.09
sw*b* w	2.58	2.50	2.42	2.33	2.25	2.17	2.08	1.59	1.50	1.42	1.36
w s w	3.51	3.41	3.31	3.21	3.11	3.01	2.50	2.39	2.28	2.18	2.11
w *by* s	4.53	4.42	4.30	4.19	4.08	3.57	3.44	3.31	3.18	3.07	2.58
Weſt.	6.00	5.48	5.36	5.25	5.13	5.01	4.48	4.35	4.21	4.05	4.00
w *by* n					6.23	6.12	5.59	5.46	5.33	5.22	5.13
w n w									6.46	6.37	6.29
☉ ſet.	6.00	6.09	6.17	6.26	6.35	6.44	6.54	7.04	7.14	7.22	7.29
Sun's	d.m.	d.m.	d.m.	d.m.	d.m	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	3.18	6.38	9.57	13.18	16.40	20.4	22.25	26.57	29.46	31.54

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.30	0.31	0.33	0.34	0.36	0.37	0.39	0.40	0.42	0.44	0.45
s s w	1.01	1.04	1.07	1.10	1.13	1.16	1.19	1.23	1.26	1.29	1.31
s w*by* s	1.35	1.39	1.44	1.49	1.53	1.58	2.03	2.08	2.13	2.18	2.21
s w	2.13	2.19	2.26	2.32	2.39	2.45	2.52	2.59	3.06	3.12	3.17
sw*b* w	2.58	3.06	3.14	3.22	3.31	3.39	3.48	3.57	4.06	4.14	4.20
w s w	3.51	4.01	4.11	4.21	4.30	4.40	4.51	5.02			
w *by* s	4.53	5.04	5.15	5.26							
Weſt	6.00										
☉ ſet.	6.00	5.51	5.43	5.34	5.25	5.16	5.06	4.56	4.46	4.38	4.31

A Sun-Dial for the Latitnde of 42 Degrees.

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.30	9.29	0.27	0.26	0.24	0.23	0.21	0.20	0.18	0.17	0.16
s s w	1.02	0.59	0.56	0.53	0.50	0.47	0.44	0.41	0.37	0.34	0.32
s w *by* s	1.36	1.32	1.27	1.23	1.18	1.14	1.09	1.04	0.58	0.54	0.51
s w	2.15	2.09	2.03	1.56	1.50	1.44	1.37	1.30	1.23	1.17	1.13
s w *b* w	3.00	2.52	2.44	2.36	2.28	2.20	2.12	2.03	1.54	1.46	1.40
w s w	3.53	3.43	3.34	3.24	3.15	3.05	2.54	2.44	2.33	2.23	2.16
w *by* s	4.54	4.43	4.32	4.21	4.10	4.00	3.47	3.36	3.23	3.12	3.03
Weſt	6.00	5.49	5.37	5.26	5.15	5.03	4.51	4.39	4.25	4.13	4.04
w *by* n					6.23	6.12	6.00	5.49	5.35	5.24	5.16
w n w								6.58	6.47	6.37	6.30
⊙ ſet	6.00	6.09	6.18	6.27	6.37	6.46	6.56	7.06	7.17	7.25	7.32
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	3.21	6.44	10.6	13.31	16.57	20.23	23.52	27.24	30.16	32.27

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.30	0.32	0.33	0.35	0.36	0.38	0.39	0.41	0.43	0.44	0.45
s s w	1.02	1.05	1.08	1.11	1.14	1.17	1.20	1.23	1.27	1.30	1.32
s w *by* s	1.36	1.41	1.46	1.50	1.55	1.59	2.04	2.09	2.14	2.19	2.22
s w	2.15	2.21	2.28	2.34	2.40	2.46	2.53	3.00	3.07	3.13	3.17
s w *b* w	3.00	3.08	3.16	3.24	3.32	3.40	3.49	3.57	4.07	4.14	4.20
w s w	3.53	4.02	4.12	4.22	4.31	4.41	4.52				
w *by* s	4.45	5.04	5.15	5.26							
Weſt	6.00										
⊙ ſet	6.00	5.51	5.42	5.33	5.23	5.14	5.04	4.54	4.43	4.35	4.28

A Sun-Dial for the Latitude of 43 *Degrees.*

North Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.31	0.29	0.28	0.27	0.25	0.24	0.22	0.21	0.19	0.18	0.17
s s w	1.03	1.00	0.57	0.54	0.51	0.48	0.45	0.42	0.39	0.36	0.34
s w *by* s	1.38	1.34	1.29	1.24	1.20	1.15	1.11	1.06	1.01	0.57	0.53
s w	2.17	2.11	2.05	1.59	1.53	1.47	1.40	1.33	1.26	1.2[illegible]	1.16
s w *b* w	3.02	2.55	2.47	2.39	2.31	2.23	2.15	2.07	1.58	1.50	1.44
w s w	3.55	3.46	3.36	3.27	3.18	3.08	2.58	2.48	2.37	2.28	2.21
w *by* s	4.55	4.45	4.34	4.23	4.13	4.03	3.51	3.40	3.27	3.17	3.09
Weſt.	6.00	4.49	5.38	5.27	5.16	5.05	4.53	4.41	4.27	4.17	4.19
w *by* n					6.23	6.13	6.01	5.50	5.37	5.27	5.19
w n w.								5.58	5.47	6.38	6.31
☉ ſet.	6.00	6.09	6.19	6.28	6.38	6.48	6.58	7.09	7.19	7.28	7.36
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	3.25	6.51	10.17	13.44	17.12	20.42	24.16	27.53	30.48	33.2

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.31	0.32	0.34	0.35	0.37	0.38	0.40	0.41	0.43	0.44	0.45
s s w	1.03	1.06	1.09	1.12	1.15	1.18	1.21	1.24	1.27	1.30	1.32
s w *by* s	1.38	1.42	1.47	1.52	1.56	2.01	2.05	2.10	2.15	2.19	2.23
s w	2.17	2.23	2.29	2.36	2.42	2.48	2.54	3.01	3.08	3.14	3.18
s w *b* w	3.02	3.10	3.18	3.26	3.33	3.41	3.50	3.58	4.07	4.14	4.20
w s w	3.55	4.04	4.14	4.23	4.32	4.42	4.52				
w *by* s	4.55	5.05	5.16	5.27							
Weſt.	6.00										
☉ ſet.	6.00	5.51	5.41	5.32	5.22	5.12	5.02	4.51	4.41	4.32	4.24

A Sun-Dial for the Latitude of 44 *Degrees.*

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.31	0.30	0.29	0.27	0.26	0.24	0.23	0.21	0.20	0.18	0.17
s s w	1.04	1.01	0.58	0.56	0.53	0.50	0.47	0.44	0.40	0.38	0.36
s w*by*s	1.40	1.35	1.31	1.27	1.22	1.18	1.13	1.08	1.03	0.59	0.56
s w	2.19	2.13	2.07	2.01	1.55	1.49	1.43	1.36	1.29	1.24	1.20
sw*b* w	3.04	2.57	2.49	2.42	2.34	2.26	2.18	2.10	2.01	1.54	1.49
w s w	3.57	3.48	3.38	3.29	3.21	3.12	3.02	2.52	2.41	2.33	2.26
w *by* s	4.56	4.46	4.36	4.25	4.16	4.05	3.54	3.43	3.31	3.21	3.13
Weſt.	6.00	5.50	5.39	5.28	5.18	5.07	4.56	4.44	4.31	4.21	4.13
w *by* n					6.23	6.13	6.02	5.51	5.39	5.29	5.21
w n w								6.59	5.48	6.39	6.31
☉ ſet	6.00	6.10	6.19	6.29	6.39	6.49	7.00	7.11	7.22	7.31	7.39
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	3.28	6,58	1027	13.58	18.20	21.5	24.42	28.23	31.23	33.41

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.31	0.33	0.34	0.36	0.37	0.39	0.40	0.42	0.43	0.45	0.46
s s w	1.04	1.07	1.10	1.13	1.16	1.19	1.22	1.25	1.28	1.31	1.33
sw *bys*	1.40	1.44	1.48	1.53	1.57	2.02	2.06	2.11	2.16	2.20	2.23
s w	2.19	2.25	2.31	2.37	2.43	2.49	2.56	3.02	3.09	3.14	3.19
sw*b*w	3.04	3.12	3.19	3.27	3.35	3.42	3.51	3.59	4.08	4.15	4.20
w s w	3.57	4.06	4.15	4.24	4.33	4.42	4.52				
w *by* s	4.56	5.06	5.16	5.27							
Weſt	6.00										
☉ ſet.	6.09	5.50	5.41	5.31	5.21	5.11	5.00	4.49	4.38	4.29	4.21

A Sun-Dial for the Latitude of 45 Degrees.

North Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.32	0.31	0.29	0.28	0.26	0.25	0.24	0.22	0.20	0.19	0.18
s s w	1.05	1.03	1.00	0.57	0.54	0.51	0.48	0.45	0.42	0.39	0.37
sw *by* s	1.41	1.37	1.33	1.28	1.24	1.19	1.15	1.10	1.05	1.01	0.58
s w	2.21	2.15	2.09	2.03	1.58	1.53	1.45	1.39	1.33	1.27	1.23
sw*b*w	3.06	2.59	2.52	2.45	2.37	2.29	2.22	2.13	2.05	1.58	1.53
w s w	3.59	3.50	3.41	3.32	3.23	3.14	3.05	2.55	2.45	2.37	2.30
w *by* s	4.57	4.47	4.38	4.28	4.18	4.08	3.57	3.46	3.35	3.26	3.18
Weſt	6.00	5.50	5.40	5.30	5.19	5.09	4.58	4.46	4.35	4.25	4.17
w *by* n					6.24	6.14	6.03	5.52	5.41	5.31	5.24
w n w								6.58	6.48	6.40	6.33
nw*b*w											7.40
⊙ ſet	6.00	6.10	6.20	6.30	5.41	6.51	7.02	7.13	7.25	7.35	7.43
Sun's Amp.	d.m. 0.00	d.m. 3.32	d.m. 7.05	d.m. 10.3	d.m. 14.13	d.m. 17.49	d.m. 21.28	d.m. 25.5	d.m. 28.56	d.m. 32.0	d.m. 24.20

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.32	0.33	0.35	0.36	0.38	0.39	0.41	0.42	0.44	0.45	0.46
s s w	1.05	1.08	1.11	1.14	1.17	1.20	1.23	1.26	1.29	1.31	1.33
sw *by* s	1.41	1.45	1.50	1.54	1.58	2.03	2.07	2.12	2.17	2.21	2.24
s w	2.21	2.27	2.33	2.39	2.44	2.51	2.57	3.03	3.10	3.15	3.19
s w*b*w	3.06	3.14	3.21	3.28	3.36	3.44	3.51	4.00	4.08	4.15	
w s w	3.59	4.07	4.16	4.25	4.34	4.43	4.52				
w *by* s	4.57	5.07	5.17	5.26							
Weſt	6.00										
⊙ ſet	6.00	5.50	5.40	5.30	5.19	5.09	4.58	4.47	4.35	4.25	4.17

A Sun Dial for the Latitude of 46 Degrees.

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.33	0.31	0.30	0.29	0.27	0.26	0.24	0.23	0.21	0.20	0.19
s s w	1.06	1.04	1.01	0.58	0.55	0.52	0.49	0.46	0.43	0.41	0.39
s w*by*s	1.43	1.38	1.34	1.30	1.26	1.21	1.17	1.12	1.08	1.04	1.01
s w	2.23	2.17	2.11	2.06	2.00	1.54	1.48	1.42	1.36	1.30	1.26
s w*b*w	3.08	3.01	2.54	2.47	2.40	2.32	2.25	2.17	2.09	2.02	1.57
w s w	4.00	3.52	3.43	3.35	3.26	3.17	3.08	2.59	2.49	2.41	2.35
w *by* s	5.58	4.49	4.39	4.30	4.20	4.11	4.00	3.50	3.39	3.30	3.23
Weſt	6.00	5.50	5.40	5.30	5.20	5.11	5.00	4.49	4.38	4.28	4.21
w *by* n					6.24	6.14	6.04	5.54	5.43	5.33	5.26
w n w								6.59	6.49	6.41	6.34
nw*b* w											7.40
☉ ſet	6.00	6.10	6.21	6.31	6.42	6.53	7.04	7.16	7.29	7.39	7.47
Sun's	d.m.	d.m.	d.m.	d. m.	d.m.	d.m.	d.m.	d. m	d.m.	d.m.	d m.
Amp.	0.00	3.36	7.11	10.50	14.27	18.9	21.53	25.39	29.30	32.37	35.2

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.33	0.34	0.35	0.37	0.38	0.40	0.41	0.42	0.44	0.45	0.46
s s w	1.06	1.09	1.12	1.15	1.18	1.20	1.23	1.26	1.29	1.32	1.34
s w*by*s	1.43	1.47	1.51	1.55	2.00	2.04	2.08	2.13	2.18	2.22	2.25
s w	2.23	2.29	2.34	2.40	2.46	2.52	2.58	3.04	3.10	3.16	3.20
sw*b* w	3.08	3.16	3.23	3.30	3.37	3.45	3.52	4.00	4.08	4.15	
w s w	4.00	4.09	4.17	4.26	4.34	4.43					
w *by* s	5.58	5.08	5.17	5.26							
Weſt	6.00										
☉ ſet	6.00	5.50	5.39	5.29	5.18	5.07	4.56	4.44	4.31	4.21	4.13

A Sun-Dial for the Latitude of 47 Degrees.

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.33	0.32	0.30	0.29	0.28	0.26	0.25	0.23	0.22	0.21	0.20
s s w	1.07	1.05	1.02	0.59	0.56	0.54	0.51	0.48	0.45	0.42	0.40
s w*by*s	1.44	1.40	1.36	1.32	1.28	1.23	1.19	1.15	1.10	1.06	1.03
s w	2.25	2.19	2.14	2.08	2.02	1.57	1.51	1.45	1.39	1.33	1.29
sw*b*w	3.10	3.03	2.56	2.49	2.42	2.35	2.28	2.20	2.14	2.06	2.01
w s w	4.02	3 54	3.46	3.37	3.29	3.20	3.12	3.03	2.53	2.45	2.39
w *by* s	4.59	4.50	4.41	4.32	4.23	4.13	4.03	3.53	3.43	3.34	3.27
Weſt.	6.00	5.51	5.41	5.32	5.22	5.12	5.03	4.46	4.41	4.31	4.24
w *by* n				6.34	6.25	6.15	6.05	5.55	5.44	5.36	5.29
w n w							7.08	6.59	6.49	6.42	6.35
nw*b*w											7.40
⊙ ſet.	6.00	6.11	6.22	6.33	6.44	6.55	7.07	7.20	7.32	7.43	7.51
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m	d.m.
Amp.	0.00	3.40	7.21	11.2	14.45	18.30	22.18	26.10	30.7	33.1[illegible]	35.48

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.33	0.34	0.36	0.37	0.38	0.40	0.41	0.43	0.44	0.45	0.46
s s w	1.07	1.10	1.13	1.16	1.18	1.21	1.24	1.27	1.30	1.32	1.34
s w*by*s	1.44	1.48	1.52	1.57	2.01	2.05	2.09	2.14	2.18	2.22	2.25
s w	2.25	2.30	2.36	2.41	2.47	2.53	2.59	3.05	3.11	3.16	3.20
s w*b*w	3.10	3.17	3.24	3.31	3.38	3.45	3.53	4.00	4.07	4.15	
w s w	4.02	4.10	4.18	4.26	4.35	4.43					
w *by* s	4.59	5.08	5.17								
Weſt.	5.00										
⊙ ſet	6.00	5.49	5.38	5.27	5.16	5.05	4.53	4.40	4,28	4.17	4.09

A Sun Dial for the Latitude of 48 *Degrees.*

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.34	0.32	0.31	0.30	0.28	0.27	0.26	0.24	0.23	0.22	0.21
s s w	1.08	1.06	1.03	1.00	0.58	0.55	0.52	0.49	0.46	0.44	0.42
s w*by*s	1.46	1.42	1.38	1.34	1.30	1.25	1.21	1.17	1.12	1.08	1.05
s w	2.26	2.21	2.16	2.10	2.05	1.59	1.53	1.47	1.41	1.36	1.32
s w*b*w	3.12	3.05	2.59	2.52	2.45	2.39	2.31	2.23	2.16	2.09	2.04
w s w	4.03	3.56	3.48	3.40	3.32	3.23	3.15	3.06	2.57	2.49	2.43
w *by* s	5.00	4.51	4.43	4.34	4.25	4.16	4.06	3.56	3.46	3.38	3.31
Weſt	6.00	5.51	5.42	5.33	5.23	5.14	5.04	4.54	4.43	4.35	4.28
w *by* n					6.25	6.16	6.06	5.56	5.46	5.38	5.31
w n w							7.08	6.59	6.50	6.42	6.36
nw*b* w										7.45	7.40
⊙ ſet	6.00	6.11	6.22	6.33	6.45	6.57	7.09	7.22	7.35	7.47	7.56
Sun's	d.m.	d.m.	d.m.	d. m.	d.m.	d.m.	d. m.	d. m	d.m.	d.m.	d m.
Amp.	0.00	3.49	7.29	11.15	15.2	18.52	22.45	26.43	30.45	34.3	36.34

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.34	0.35	0.36	0.38	0.39	0.40	0.42	0.43	0.45	0 47	0.49
s s w	1.08	1.11	1.14	1.16	1.19	1.22	1.25	1.28	1.31	1.33	1.35
s w*by*s	1.46	1.50	1.54	1.58	2.02	2.06	2.10	2.15	2.19	2.23	2.26
s w	2.26	2.32	2.37	2.43	2.48	2.54	3.00	3.05	3.12	3.17	3.21
sw*b* w	3.12	3.19	3.26	3.32	3.39	3.45	3.53	4.01	4.09		
w s w	4.03	4.11	4.19	4.27	4.35	4.44					
w *by* s	5.00	5.09	5.17	5.26							
Weſt	6.00										
⊙ ſet	5.00	5.49	5.38	5.27	5.15	5.03	4.51	4.38	4.25	4.13	4.04

A Sun-Dial for the Latitude of 49 *Degrees.*

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.34	0.33	0.32	1.30	0.29	0.28	0.26	0.25	0.23	0.22	0.21
s s w	1.09	1.07	1.04	1.02	0.59	0.56	0.53	0.51	0.48	0.45	0.43
s w*by*s	1.47	1.43	1.39	1.35	1.31	1.27	1.23	1.19	1.14	1.11	1.08
s w	2.28	2.23	2.18	2.12	2.07	2.01	1.56	1.50	1.44	1.39	1.35
sw*b*w	3.14	3.07	3.01	2.54	2.48	2.41	2.34	2.27	2.19	2.13	2.08
w s w	4.05	3 57	3.50	3.42	3.34	3.26	3.18	3.09	3.00	2.53	2.47
w *by* s	5.01	4.53	4.44	4.36	4.27	4.18	4.09	4.00	3.50	3.42	3.35
Weſt.	6.00	5.51	5.42	5.34	5.25	5.16	5.06	4.56	4.46	4.38	4.31
w *by* n				6.34	6.25	6.16	6.07	5.58	5.48	5.40	5.33
w n w							7.08	7.00	6.51	6.43	6.38
nw*b*w										7.45	7.40
☉ ſet.	6.00	6.11	6.23	6.35	6.47	6.59	7.12	7.25	7.39	7.51	8.00
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m	d.m.	d.m.	d.m.	d. m.	d.m.
Amp.	0.00	3.48	7.38	11.28	15.21	19.15	23.14	27.17	31.25	34.48	37.26

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15d	17 d	20 d	22 d	23d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.34	0.35	0.37	0.38	0.39	0.41	0.42	0.43	0.45	0.46	0.47
s s w	1.09	1.12	1.15	1.17	1.20	1.23	1.25	1.28	1.31	1.33	1.35
s w*by*s	1.47	1.51	1.55	1.59	2.03	2.07	2.11	2.15	2.20	2.23	2.26
s w	2.28	2.33	2.39	2.44	2.49	2.55	3.00	3.06	3.12	3.17	3.21
s w*b*w	3.14	3.20	3.27	3.34	3.40	3.47	3.54	4.01	4.09		
w s w	4.05	4.13	4.20	4.28	4.36	4.44					
w *by* s	5.01	5.09	5.18								
Weſt.	6.00										
☉ ſet	5.00	5.49	5.37	5.25	5.13	5.01	4.48	4.35	4.21	4.09	4.00

A Sun-Dial for the Latitude of 50 *Degrees.*

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.35	0.33	0.32	0.31	0.30	0.28	0.27	0.26	0.24	0.23	0.22
s s w	1.10	1.08	1.05	1.03	1.00	0.58	0.55	0.52	0.49	0.47	0.45
sw *by* s	1.48	1.45	1.41	1.37	1.33	1.29	1.25	1.21	1.16	1.13	1.10
s w	2.30	2.25	2.20	2.15	2.09	2.04	1.58	1.53	1.47	1.42	1.38
sw*b*w	3.16	3.09	3.03	2.56	2.50	2.43	2.36	2.30	2.23	2.16	2.12
w s w	4.06	3.59	3.51	3.44	3.36	3.29	3.21	3.13	3.04	2.57	2.51
w *by* s	5.02	4.54	4.45	4.37	4.29	4.20	4.12	4.03	3.53	3.45	3.39
Weſt	6.00	5.52	5.43	5.34	5.26	5.17	5.08	4.59	4.49	4.41	4.34
w *by* n				6.34	6.25	6.17	6.08	5.59	5.49	5.42	5.36
w n w							7.08	7.00	6.51	6.44	6.39
nw*b*w										7.45	7 41
⊙ ſet	6.00	6.12	6.24	6.36	6.49	7.01	7.14	7.28	7.43	7.55	8.05
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	3.53	7.48	11.43	15.40	19.40	23.44	27.53	32.09	35.40	38.20

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.35	0.36	0.37	0.38	0.40	0.41	0.42	0.44	0.45	0.46	0.47
s s w	1.10	1.13	1.15	1.18	1.21	1.23	1.26	1.29	1.32	1.34	1.36
sw *by* s	1.48	1.52	1.56	2.00	2.04	2.08	2.12	2.16	2.20	2.24	2.27
s w	2.30	2.35	2.40	2.45	2.50	2.56	3.01	3.07	3.13	3.17	3.21
s w*b*w	3.16	3.22	3.28	3.35	3.41	3.48	3.55	4.02	4.09		
w s w	4.06	4.14	4.21	4.29	4.36	4.44					
w *by* s	5.02	5.10	5.18								
Weſt	6.00										
⊙ ſet	6.00	5.48	5.36	5.24	5.11	4.59	4.46	4.32	4.17	4.05	3.55

A Sun-Dial for the Latitude of 51 Degrees.

North Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.35	0.34	0.33	0.31	0.30	0.29	0.28	0.26	0.25	0.24	0.23
s s w	1.11	1.09	1.06	1.04	1.01	0.59	0.56	0.53	0.51	0.48	0.47
sw *by* s	1.50	1.46	[illegible]	1.39	1.35	1.31	1.27	1.23	1.19	1.15	1.12
s w	2.31	2.26	2.21	2.16	2.11	2.06	2.01	1.55	1.50	1.45	1.41
s w *b* w	3.17	3.11	3.05	2.59	2.52	2.46	2.39	2.33	2.26	2.20	2.15
w s w	4.08	4.01	3.53	3.46	3.39	3.31	3.24	3.16	3.07	3.01	2.55
w *by* s	5.03	4.55	4.47	4.39	4.31	4.22	4.14	4.05	3.56	3.49	3.43
Weſt.	6.00	5.52	5.44	5.35	5.27	5.18	5.10	5.01	4.51	4.44	4.37
w *by* n				6.34	6.26	6.17	5.09	6.00	5.51	5.44	5.38
w n w							7.08	7.00	6.52	6.45	6.40
nw *b* w										7.45	7.41
☉ ſet.	6.00	5.13	6.25	6.38	6.50	7.03	7.17	7.32	7.47	8.00	8.10
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m	d.m.	d.m.	d.m	d.m.	d.m.
Amp.	0.00	3.58	7.58	11.58	16.1	2.08	24.17	28.33	32.55	36.32	39.20

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.35	0.36	0.38	0.39	0.40	0.41	0.43	0.44	0.46	0.47	0.48
s s w	1.11	1.14	1.16	1.19	1.21	1.24	1.27	1.29	1.32	1.34	1.36
sw *by* s	1.50	1.53	1.57	2.01	2.05	2.09	2.13	2.17	2.21	2.24	2.27
s w	2.31	2.36	2.41	2.46	2.52	3.57	3.02	3.07	3.13	3.18	3.21
s w *b* w	3.17	3.23	3.30	3.36	3.42	3.49	3.55	4.02	4.09		
w s w	4.08	4.15	4.22	4.29	4.37	4.44					
sw *b* s	5.03	5.10	5.18								
Weſt.	6.00										
☉ ſet.	6.00	5.47	5.35	5.22	5.12	4.57	4.43	4.28	4.13	4.00	3.50

A Sun-Dial for the Latitude of 52 Degrees.

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.36	0.34	0.33	0.32	0.31	0.30	0.28	0.27	0.26	0.25	0.24
s s w	1.12	1.10	1.08	1.05	1.03	1.00	0.57	0.55	0.52	0.50	0.48
sw *by* s	1.51	1.47	1.44	1.40	1.36	1.33	1.29	1.25	1.21	1.17	1.15
s w	2.33	2.28	2.23	2.18	2.13	2.08	2.03	1.58	1.52	1.48	1.44
s w*b*w	3.19	3.13	3.07	3.01	2.55	2.48	2.42	2.36	2.29	2.24	2.19
w s w	4.09	4.02	3.55	3.48	3.41	3.34	3.26	3.19	3.11	3.04	2.59
w *by* s	5.03	4.56	4.48	4.40	4.33	4.25	4.16	4.08	3.59	3.52	3.46
Weſt.	6.00	5.52	5.44	5.36	5.28	5.20	5.12	5.03	4.54	4.46	4.40
w *by* n				6.33	6.26	6.18	6.10	6.01	5.53	5.45	5.40
w n w							7.08	7.00	6.53	6.46	6.41
nw *b*w										7.45	7.40
☉ ſet	6.00	6.13	6.26	6.39	6.52	7.06	7.20	7.35	7.51	8.05	8.16
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	4.03	8.08	12.14	16.23	20.40	24.51	29.14	33.46	37.29	40.21

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.36	0.37	0.38	0.39	0.41	0.42	0.43	0.44	0.46	0.47	0.48
s s w	1.12	1.15	1.17	1.20	1.22	1.25	1.27	1.30	1.33	1.35	1.37
sw *by* s	1.51	1.55	1.58	2.02	2.06	2.10	2.13	2.17	2.22	2.25	2.28
s w	2.33	2.38	2.43	2.48	2.53	2.58	3.03	3.08	3.13	3.18	3.22
s w*b*w	3.19	3.25	3.31	3.37	3.43	3.49	3.56	4.02	4.10		
w s w	4.09	4.16	4.23	4.30	4.37	4.44					
sw *b* s	5.03	5.11	5.19								
Weſt.	6.00										
☉ ſet.	6.00	5.47	5.34	5.21	5.08	4.54	4.40	4.25	4.09	3.55	3.44

A Sun Dial for the Latitude of 53 *Degrees.*

North Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.36	0.35	0.34	0.33	0.31	0.30	0.29	0.28	0.26	0.25	0.24
s s w	1.13	1.11	1.08	1.06	1.04	1.01	0.59	0.56	0.53	0.51	0.50
sw*by*s	1.52	1.49	1.45	1.41	1.38	1.34	1.31	1.27	1.23	1.19	1.17
s w	2.34	2.30	2.25	2.20	2.15	2.10	2.05	2.00	1.55	1.51	1.47
sw*b*w	3.20	3.15	3.09	3.03	2.57	2.51	2.45	2.38	2.32	2.26	2.22
w s w	4.10	4.04	3.57	3.50	3.43	3.36	3.29	3.22	3.14	3.08	3.03
w *by* s	5.04	4.57	4.49	4.42	4.34	4.27	4.19	4.11	4.02	3.55	3.50
Weſt.	6.00	5.52	5.45	5.37	5.29	5.22	5.15	5.05	4.56	4.49	4.43
w *by* n				6.34	6.26	6.19	6.11	6.03	5.54	5.47	5.42
w n w							7.08	7.01	6.53	6.47	6.42
nw*b*w									7.51	7.46	7.43
☉ ſet	6.00	6.14	6.27	6.41	6.54	7.08	7.23	7.39	7.56	8.10	8.21
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	4.09	8.19	12.31	16.46	21.5	25.28	29.59	34.39	38.31	41.29

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.36	0.37	0.38	0.40	0.41	0.42	0.43	0.45	0.46	0.47	0.48
s s w	1.13	1.16	1.18	1.20	1.23	1.25	1.28	1.30	1.33	1.35	1.37
sw *by*s	1.52	1.56	2.00	2.03	2.07	2.10	2.14	2.18	2.22	2.25	2.28
s w	2.34	2.39	2.44	2.49	2.54	2.58	3.03	3.09	3.14	3.18	3.22
swbw	3.20	3.26	3.32	3.38	3.44	3.50	3.56	4.02			
w s w	4.10	4.17	4.24	4.30	4.37	4.44					
w *by* s	5.04	5.11	5.19								
Weſt	6.00										
☉ ſet	6.00	5.46	5.33	5.19	5.06	4.52	4.37	4.21	4.04	3.50	3.39

A Sun-Dial for the Latitude of 54 *Degrees.*

North Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.37	0.35	0.34	0.33	0.32	0.31	0.29	0.28	0.27	0.26	0.25
s s w	1.14	1.12	1.09	1.07	1.05	1.02	1.00	0.57	0.55	0.53	0.51
s w*by*s	1.54	1.50	1.47	1.43	1.40	1.36	1.32	1.29	1.25	1.22	1.19
s w	2.36	2.31	2.27	2.22	2.17	2.12	2.08	2.03	1.57	1.53	1.50
sw *b*w	3.22	3.16	3.11	3.05	2.59	2.53	2.47	2.41	2.35	2.29	2.25
w s w	4.12	4.05	3.59	3.52	3.45	3.39	3.32	3.24	3.17	3.11	3.06
w *by* s	5.05	4.58	4.51	4.43	4.36	4.29	4.21	4.13	4.05	3.58	3.53
Weſt.	6.00	5.53	5.45	5.38	5.31	5.23	5.15	5.07	4.59	4.52	4.46
w *by*n				6.34	6.27	6.19	6.12	6.04	5.56	5.49	5.44
w n w							7.09	7.01	6.54	6.48	6.43
nw*b*w									7.51	7.46	7.42
☉ ſet.	6.00	6.14	6.28	6.42	6.50	7.11	7.27	7.43	8.00	8.15	8.27
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	4.12	8 32	12.49	17.11	21.36	26.7	30.45	35.55	39.37	42 43

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.37	0.38	0.39	0.40	0.41	0.42	0.44	0.45	0.46	0.47	0.48
s s w	1.14	1.16	1.19	1.21	1.24	1.26	1.28	1.31	1.33	1.35	1.37
s w*by*s	1.54	1.57	2.01	2.04	2.08	2.11	2.15	2.19	2.23	2.26	2.28
s w	2.36	2.41	2.45	2.50	2.54	2.59	3.04	3.06	3:15	3.19	3.22
sw*b*w	3.22	3.27	3.33	3.39	3.44	3.50	3.56	4.03			
w s w	4.12	4.18	4.24	4.31	4.38	4.45					
w *by* s	5.05	5.12	5.19								
Weſt.	6.00										
☉ ſet.	6.00	5.46	5.32	5.18	5.04	4.49	4.33	4.17	4.00	3.45	3.33

A Sun Dial for the Latitude of 55 *Degrees.*

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.37	0.36	0.35	0.34	0.33	0.31	0.30	0.29	0.28	0.27	0.26
s s w	1.15	1.13	1.10	1.08	1.06	1.03	1.01	0.59	0.56	5.54	0.52
sw*by*s	1.55	1.51	1.48	1.45	1.41	1.38	1.34	1.30	1.27	1.23	1.21
s w	2.37	2.33	2.28	2.24	2.19	2.14	2.10	2.05	2.00	1.55	1.52
sw*b*w	3.23	3.18	3.12	3.07	3.01	2.56	2.50	2.44	2.38	2.33	2.29
w s w	5.13	4.06	4.00	3.54	3.47	3.41	3.34	3.27	3.20	3.14	3.10
w *by* s	5.06	4.59	4.52	4.45	4.38	4.31	4.23	4.16	4.08	4.02	3.56
Weſt.	6.00	5.53	5.46	5.39	5.32	5.24	5.17	5.09	5.01	4.54	4.49
w *by* n					6.27	6.20	6.13	6.05	5.57	5.51	5.46
w n w							7.09	7.02	6.55	6.49	6.44
nw*b*w									7.51	7.46	7.42
⊙ ſet	6.00	6.14	6.29	6.43	6.58	7.14	7.30	7.47	8.05	8.21	8.34
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	4.21	8.45	13.9	17.37	22.10	26.49	31.42	36.36	40.46	44.2

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.37	0.38	0.39	0.40	0.42	0.43	0.44	0.45	0.46	0.47	0.48
s s w	1.15	1.17	1.20	1.22	1.24	1.26	1.29	1.31	1.34	1.36	1.38
sw *by*s	1.55	1.58	2.01	2.05	2.08	2.12	2.16	2.19	2.23	2.26	2.29
s w	2.37	2.42	2.46	2.51	2.55	3.00	3.05	3.10	3.15	3.19	3.22
sw*b*w	3.23	3.29	3.34	3.40	3.45	3.51	3.57	4.03			
w s w	4.13	4.19	4.25	4.32	4.38	4.45					
w *by* s	5.06	5.12	5.19								
Weſt	6.00										
⊙ ſet	6.00	5.46	5.31	5.17	5.02	4.46	4.30	4.13	3.55	3.39	3.26

A Sun-Dial for the Latitude of 56 Degrees.

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.37	0.36	0.35	0.34	0.33	0.32	0.31	0.30	0.28	0.27	0.26
s s w	1.16	1.14	1.11	1.09	1.07	1.05	1.02	1.00	0.57	0.55	0.53
s w*by*s	1.56	1.53	1.49	1.46	1.43	1.39	1.36	1.32	1.28	1.26	1.23
s w	2.39	2.34	2.30	2.26	2.21	2.16	2.12	2.07	2.02	1.59	1.55
sw *b*w	3.25	3.19	3.14	3.09	3.03	2.58	2.52	2.46	2.40	2.36	2.32
w s w	4.14	4.08	4.02	3.56	3.50	3.43	3.37	3.30	3.23	3.17	3.13
w *by* s	5.06	4.00	4.53	4.46	4.40	4.33	4.26	4.14	4.11	4.05	4.00
Weſt.	5.00	5.53	5.46	5.39	5.32	5.26	5.18	5.11	5.03	4.57	4.52
w *by*n				6.34	6.28	6.21	6.14	6.06	5.59	5.53	5.48
w n w						7.15	7.09	7.02	6.55	6.50	6.45
nw*b*w									7.51	7.46	7.43
☉ ſet.	6.00	6.15	6.30	6.45	7.00	7.16	7.34	7.52	8.10	8.27	3.41
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	4.28	8.58	13.29	18.6	22.46	27.34	32.34	37.42	42.4	45.30

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.37	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.47	0.48	0.49
s s w	1.16	1.18	1.20	1.22	1.25	1.27	1.29	1.32	1.34	1.36	1.38
s w*by*s	1.56	1.59	2.02	2.06	2.09	2.13	2.16	2.20	2.24	2.26	2.29
s w	2.39	2.43	2.47	2.52	2.57	3.01	3.06	3.10	3.15	3.19	—
s w*b*w	3.25	3.30	3.35	3.40	3.46	3.51	3.57	4.03			
w s w	4.14	4.20	4.26	4.32	4.38						
w *by* s	5.06	5.13	5.19								
Weſt.	6.00										
☉ ſet.	6.00	5.45	5.30	5.15	5.00	4.44	4.26	4.08	3.50	3.33	3.19

A Sun-Dial for the Latitude of 57 *Degrees.*

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 c	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.38	0.37	0.36	0.35	0.34	0.32	0.31	0.30	0.29	0.28	0.27
s s w	1.17	1.14	1.12	1.10	1.08	1.06	1.04	1.01	0.59	0.57	0.55
s w*bys*	1.57	1.54	1.51	1.47	1.44	1.41	1.37	1.34	1.30	1.27	1.25
s w	2.40	2.36	2.32	2.24	2.23	2.18	2.14	2.10	2.05	2.01	1.58
sw*b*w	3.26	3.21	3.16	3.11	3.05	3.00	2.55	2.49	2.43	2.38	2.35
w s w	4.15	4.09	4.03	3.57	3.51	3.45	3.39	3.33	3.26	3.20	3.16
w *by* s	5.07	5.00	4.54	4.47	4.41	4.34	4.28	4.21	4.13	4.07	4.03
Weſt.	6.00	5.53	5.47	5.40	5.33	5.27	5.20	5.13	5.05	4.59	4.54
w *by* n				6.34	6.28	6.21	5.14	6.07	6.00	5.54	5.50
w n w						7.15	7.09	7.03	6.56	6.51	6.46
nw*b*w									7.52	7.47	7.43
n w											8.30
☉ ſet.	6.00	6.16	6.31	6.47	7.03	7.20	7.38	7.56	8.16	8.34	3.48
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	4.35	9.13	13.52	18.36	23.24	28.22	33.31	38.53	43.27	47.2

South Declination

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.46	0.47	0.48	0.49
s s w	1.17	1.19	1.21	1.23	1.25	1.27	1.30	1.32	1.34	1.36	1.38
s w*bys*	1.57	2.00	2.03	2.07	2.10	2.13	2.17	2.20	2.24	2.27	2.29
s w	2.40	2.44	2.48	2.53	2.57	3.02	3.06	3.10	3.15	3.19	
s w*b*w	3.26	3.31	3.36	3.41	3.46	3.53	3.57	4.03			
w s w	4.15	4.21	4.26	4.32	4.38						
w *by* s	5.07	5.13	5.19								
Weſt.	6.00										
☉ ſet	6.00	6.44	6.29	5.13	4.57	4.40	4.22	4.04	3.44	3.26	3.12

A Sun Dial for the Latitude of 58 *Degrees.*

North Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.31	0.30	0.29	0.28
s s w	1.17	1.15	1.13	1.11	1.09	1.07	1.05	1.02	1.00	0.58	0.57
s w*by* s	1.58	1.55	1.52	1.49	1.46	1.42	1.35	1.35	1.32	1.29	1.27
s w	1.41	2.37	2.33	2.29	2.25	2.21	2.16	2.12	2.07	2.04	2.01
s w*b* w	3.27	3.22	3.17	3.12	3.07	3.02	2.57	2.51	2.46	2.41	2.38
w s w	4.16	4.10	4.05	3.59	3.53	3.47	3.41	3.35	3.29	3.23	3.19
w *by* s	5.07	5.01	4.55	4.49	4.43	4.36	4.30	4.23	4.16	4.10	4.06
Weſt	6.00	5.54	5.47	5.41	5.35	5.28	5.21	5.15	5.08	5.02	4.57
w *by* n				6.34	6.28	6.22	6.15	6.08	6.02	5.56	5.51
w n w						7.16	7.10	7.03	6.57	6.52	6.48
n w*b* w								7.57	7.52	7.47	7.44
n w											8.38
☉ ſet	6.00	6.16	6.32	6.49	7.06	7.24	7.42	8.01	8.22	8.41	8.56
Sun's	d.m.	d.m.	d.m.	d. m.	d.m.	d.m.	d. m.	d. m.	d.m.	d.m.	d.m.
Amp.	0.00	4.43	9.28	14.16	19.8	24.6	29.14	34.34	40 12	4459	48.49

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.38	0.39	0.40	0.41	0.43	0.44	0.45	0.46	0.47	0 48	0.49
s s w	1.17	1.19	1.22	1.24	1.26	1.28	1.30	1.32	1.35	1.37	1.38
s w*by* s	1.58	2.01	2.04	2.07	2.10	2.14	2.17	2.21	2.24	2.27	2.29
s w	2.41	2.45	2.49	2.53	2.57	3.02	3.06	3.10	3.15	3.19	
s w*b* w	3.27	3.32	3.37	3.42	3.47	3.52	3.57				
w s w	4.16	4.21	4.27	4.33	4.38						
w *by* s	5.07	5.13	5.19								
Weſt	5.00										
☉ ſet	5.00	5.44	5.28	5.11	4.54	4.36	4.18	3.59	3.38	3.19	3.04

A Sun-Dial for the Latitude of 59 Degrees.

North Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.39	0.38	0.37	0.36	0.35	0.34	0.32	0.31	0.30	0.29	0.28
s s w	1.18	1.16	1.14	1.12	1.10	1.08	1.06	1.04	1.01	1.00	0.58
sw *by* s	1.59	1.56	1.53	1.50	1.47	1.44	1.41	1.38	1.34	1.31	1.29
s w	2.42	2.38	2.35	2.31	2.27	2.23	2.19	2.14	2.10	2.06	2.03
s w*b*w	3.28	3.24	3.19	3.14	3.09	3.04	2.59	2.54	2.49	2.44	2.41
w s w	4.17	4.11	4.06	4.01	3.55	3.49	3.43	3.38	3.32	3.26	3.22
w *by* s	5.08	5.02	4.56	4.50	4.44	4.38	4.32	4.25	4.19	4.13	4.09
Weſt.	6.00	5.54	5.48	5.42	5.36	5.29	5.23	5.16	5.09	5.04	4.59
w *by* n				6.35	6.29	6.22	6.16	6.10	6.03	5.58	5.53
w n w						7.16	7.10	7.04	6.58	6.53	6.49
nw *b*w								7.57	7.52	7.48	7.44
n w										8.43	8.38
⊙ ſet.	6.00	6.16	6.33	6.50	7.08	7.27	7.46	8.07	8.29	8.49	9.05
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	4.51	9.45	14.41	19.42	24.51	30.10	35.43	41.37	46.40	50.44

South Declination.

Deg. Min.	0 d	2 d 30m	5 d	7 d 30m	10 d	12 d 30m	15 d	17 d 30m	20 d	22 d	23 d 30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49
s s w	1.18	1.20	1.22	1.24	1.26	1.28	1.31	1.33	1.35	1.37	1.38
sw *by* s	1.59	2.02	2.05	2.08	2.11	2.14	2.18	2.21	2.24	2.27	2.29
s w	2.42	2.46	2.50	2.54	2.58	3.02	3.06	3.11	3.15		
s w*b*w	3.28	3.33	3.38	3.43	3.47	3.52	3.57				
w s w	4.17	4.22	4.28	4.33	4.39						
w *by* s	5.08	5.14	5.19								
Weſt.	6.00										
⊙ ſet.	6.00	5.44	5.27	5.10	4.52	4.33	4.14	5.53	3.31	3.11	2.55

A Sun-Dial for the Latitude of 60 Degrees.

North Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.31	0.30	0.29
s s w	1.19	1.17	1.15	1.13	1.11	1.09	1.07	1.05	1.03	1.01	1.00
s w*by*s	2.00	1.57	1.54	1.51	1.48	1.45	1.42	1.39	1.36	1.33	1.31
s w	2.44	2.40	2.36	2.33	2.28	2.24	2.20	2.16	2.12	2.08	2.06
sw *b*w	3.29	3.25	3.20	3.16	3.11	3.06	3.01	2.56	2.51	2.47	2.44
w s w	4.18	4.13	4.07	4.02	3.57	3.51	3.46	3.40	3.34	3.29	3.25
w *by* s	5.08	5.03	4.57	4.51	4.45	4.40	4.34	4.27	4.21	4.16	4.12
Weſt.	6.00	5.54	5.48	5.42	5.36	5.31	5.24	5.18	5.11	5.06	5.02
w *by*n				6.35	6.29	6.23	6.17	6.11	6.04	5.59	5.55
w n w						7.16	7.10	7.04	6.59	6.54	5.50
nw*b*w								7.57	7.52	7.48	7.45
n w										8.41	8.39
☉ ſet.	6.00	6.17	6.35	6.53	7.11	7.30	7.51	8.13	8.36	8.58	9.15
Sun's	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.	d.m.
Amp.	0.00	5.00	10.2	15.5	20.19	25.39	31.10	36.58	43.10	48.32	52.53

South Declination.

Deg.	0 d	2 d	5 d	7 d	10 d	12 d	15 d	17 d	20 d	22 d	23 d
Min.		30m		30m		30m		30m			30m
Point.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
South	12	12	12	12	12	12	12	12	12	12	12
s *by* w	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49
s s w	1.19	1.21	1.23	1.25	1.27	1.29	1.31	1.33	1.35	1.37	1.38
s w*by*s	2.00	2.03	2.06	2.09	2.12	2.15	2.18	2.21	2.24	2.27	2.29
s w	2.44	2.47	2.51	2.55	2.59	3.03	3.07	3.11	3.15		
s w*b*w	3.29	3.34	3.39	3.43	3.48	3.53	3.58				
w s w	4.18	4.23	4.28	4.33	4.39						
w *by* s	5.08	5.14	5.20								
Weſt	6.00										
☉ ſet.	6.00	5.43	5.25	5.07	2.49	4.30	4.09	3.47	3.24	3.03	2.45

The Deſcription and Uſe of the foregoing Tables.

THeſe Tables are titled at the Head of each Page thus: A Sun-Dial for the Latitude of 00 Degrees; the next is, A Sun-Dial for the Latitude of 1 Degree; and ſo on orderly unto 60 Degrees, making in all 61 Dials; from Page (24) to Page (84.)

Each Dial hath two Tables, (the uppermoſt for North-Declination, the lowermoſt for South Declination) and twelve Columns in each Table: At the head of each Column, and right againſt Deg. Min. you have the degrees of Declination, thus 0d | 2d 30m | 5d | 7d 30m | 10d | 12d 30m | 15d | 17d 30m | 20d | 22d | 23d 30m |: d ſtanding for degree, and m for minute.

Under thoſe degrees and minutes of Declination in each Column is ſet, | h m |: h ſtands for hour, and m for minute of an hour.

In the left hand Column of each Table, under Point, (at the head) is the Points of the Compaſs, thus; South; S. by W. S. S. W. S. W. by S. S. W. *&c.* S. by W. ſtanding for South and by Weſt; S. S. W. for South South Weſt; S. W. by S. for South Weſt by South, and ſo for the reſt.

In this Impreſſion is added at the foot of each Table, the Sun's-ſetting and Amplitude, agreeable to thoſe ſeveral Declinations at the head of each Column and are diſtinguiſhed from the reſt by the words in the left-hand Column thus; Sun ſets; Sun's Amplitude; or ſo much of them as the Column can contain. Note; the Sun's-ſetting is annexed to each Table; but the Amplitude only to that for N. Declination, becauſe it is the ſame (for quantity) for South.

The Setting is hours and minutes but the Amplitude is degrees and minutes, having (d) over the degrees, and (m) over the min.

By theſe Tables (being Sun-Dials for all Latitudes) you may know the time of the Day, the Sun being viſible in any part of your Hemiſphere, as true and exact as tho' he were upon your Meridian; alſo his Riſing, Setting and Amplitude. The like may be known by any Star, whoſe Declination doth not exceed 23d. 30m. as will be evident by the following Propoſition.

Propoſition 1.

THE Latitude of the Place, the Declination, and Bearing of the Sun given; to find the Hour of the Day.

Note; By Bearing, is meant the Azimuth, or Point of the Compaſs he is upon; and that is found by ſetting the *Sun* with an Azimuth Compaſs, which is the trueſt way.

The Reſolution of this Propoſition is thus:

1. Seek the *Sun-Dial* for the given Latitude.

2. At the Head of the Table ſeek the given Declination, or the neareſt to it.

3. Find the given Bearing, among the Points of the Compaſs in the left-hand Column.

4. Then look ſtraight to the right-hand of the Bearing, till you come right under the Declination, (before found in the head of the Table;) and what Number you find there, is the hour required.

Example 1. In the Latitude of 30 d. the Sun having 15 d. N. Declination; I deſire to know at what a Clock the Sun cometh upon the S. W. Point of the Compaſs.

Look for the Table that belongeth to the Latitude of 30 d. in the Head of the Table, and for 15 d. in the Column of N. Declination, and for South Weſt on the left-hand of the Table, and in the common Angle of meeting you will find the hour of the day to be 00 h. 58 m. that is 58 minutes paſt 12 a Clock; the time required.

Example 2. I deſire to know at what a Clock the Sun cometh to the S. W. in the Latitude of 30 d. the Sun having 15 d. 00 m. S. Declination. *Anſwer*, 34 m. paſt 2 a Clock.

For if you turn to the *Dial* for *Latitude* 30 d. and in the Table for South Declination, ſeek 15 d. at the head of it, under which, and againſt S. W. (on the left hand) you will find 2 h. 34 m. the time of the day required.

If the Declination be not the ſame with the Declination in the head of the Table, then look under that Declination neareſt to the Declination propoſed.

But more exactly thus; *Find the hour for the next Declination both leſſer and greater than the Declination propoſed*, and the difference of thoſe *Hours*, as alſo of the Declinations belonging to them: then ſay, As the laſt difference is to the firſt difference, ſo is the difference between the Declination propoſed, and the next leſſer in the Table to a fourth proportional, which add to (*when the hour in the Table increaſeth*) or (*when it decreaſeth*) ſubtract from the hour belonging to the leſſer Declination aforeſaid: So you'll have the hour required exact to the *Declination* propoſed.

Example 3. Admit the ***Declination*** to be 18 d. 20 m. N. I deſire to know at what a Clock the Sun cometh upon the W. S. W. Point of the Compaſs, in the Latitude of 30 d.

In the Table, the neareſt number to 18 d. 20 m. is 17 d. 30 m. Then under 17 d. 30 m. and againſt W. S. W. is 1 h. 42 m. which ſheweth that the *Sun* cometh upon the W. S. W. Point of the Compaſs, at 42 m. paſt 1 a Clock.

Now becauſe the *Declination* propoſed, and the *Declination* in the head of the Table, are ſomewhat differing; therefore you may make a *Proportion*, very eaſily thus: under 17d. 30m. and againſt W. S. W. you find 1 h. 42 m. and under 20 d. 00 m. you find 1 deg. 25 min. the difference between theſe two Numbers is 17 m. And the difference between the *Declination* 17 d. 30 m. and 20 deg. is 2 d. 30 m. or 150 m. Alſo the difference between the Declinations 18 d. 20 m. and 17 d. 30 m. is 50 m. Then ſay, as 150 m. is to 17 m. ſo is 50 m. to 6 m. almoſt: But becauſe 50 is $\frac{1}{3}$ of 150, therefore the $\frac{1}{3}$*d* part of 17 m. is near 6 min. which ſubtracted from 1 h. 42 m. (becauſe the hour decreaſeth) and the Remainder 1 h 36 m. is the true hour of the day, the Sun being upon the W. S. W. point of the Compaſs, having 18 d. 20 m. North Declination.

Do the like with any other deg. and min. of Declination But if the Declination be not much differing from that in the Head of the Table, you need not make any Proportion: Likewiſe, if the Sun be near the Meridian, you need not make any Proportion, becauſe there the difference is but ſmall.

Note; There is none but the Afternoon Points in the Tables of theſe Dials, yet you may eaſily find the time of the day for the Forenoon Points by what follows.

A Table of Points of the Compaſs equally diſtant from the Meridian.

Forenoon Points.	*Afternoon Points.*
South.	
S. by E.	S. by W.
S. S. E.	S. S. W.
S. E. by S.	S. W. by S.
S. E.	S. W.
S. E. by E.	S. W. by W.
E. S. E.	W. S. W.
E. by S.	W. by S.
Eaſt.	Weſt.
E. by N.	W. by N.
E. N. E.	W. N. W.
N. E. by E.	N. W. by W.
N. E.	N. W.
N. E. by N.	N. W. by N.
N. N. E.	N. N. W.
N. by E.	N. by W.
North.	
Forenoon Points.	*Afternoon Points.*

For points equally diſtant from the Meridian, are equal Time from Noon; ſo that at what ſpace of Time from Noon the *Sun* is S. E. in the Forenoon, the like ſpace of Time from Noon he is S. W. after Noon.

In this laſt Table the points that ſtand right againſt one another, are equally diſtant from the Meridian; therefore to find the Hour of the Day the Sun being upon any of *Forenoon Points* ſee what time of the Day it is when the Sun is upon the *Afternoon-points*, that ſtand right againſt the *Forenoon Point* deſired, and ſubtract thoſe hours and minutes from 12 hours, the Remainder is the hour and minute of the Day required.

Ex. 4. In the Lat, of 60 deg. the Sun being N. E. I demand the hour of the day the Sun having 22 deg. North Declination?

In the Sun-Dial for Latitude of 60 degrees, look againſt N. W. which is the *Afternoon Point* correſpond to N. E the *Forenoon Point*, and finding the Declinaton 22 deg. in the head of the Table, in the common Angle of meeting is 8 hours 41 min. which ſubtract from 12 hours, the Remainder 5 hours 19 m. is the hour of the Day deſired in the Morning.

Ex. 5. The Sun being E.N.E. in the ſame Latitude with the ſame Declination, I demand the Hour of the Day?

In Latitude 60 deg. and North-Declination 22d. the Sun being W.N.W. it is 54m. paſt 6 a Clock in the Afternoon; which ſubtract from 12 hours, the Remainder is 6 minutes paſt 5 in the Morning; the time deſired.

Ex. 6. In the Latitude of 35 d. the Sun having 15 d. North Declination, the Sun being *S. E.* by *E.* I demand the hour and minute of the Day?

In the Table for Latitude 35d. look againſt *S.W.* by *W.* the *Afternoon Point* correſpondent to *S. E.* by *E.* the *Forenoon Point*, And the *Declination* 15d. in the head of the Table, in the common Angle of meeting is 1 h. 45 m. which deducted from 12 hours, the Remainder 15m. paſt 10 a Clock, the true time of day deſired.

Examp. 7. In the Latitude of 35 d. North, the Sun having 15d. *South Declination*, and being *S. E.* by *E.* I demand the hour of the day?

Anſwer, 20 m. paſt 8 a Clock; for the hour in the Table is 3 h. 40 m. which ſubtracted from 12 h. leaveth 8 h. 20 m. the Hour required.

The like is to be underſtood in any other Latitude, with any other Declination, and with any other Point.

Note; Theſe Tables ſerve as well in *South Latitude* as in *North*, only the difference will be thus:

If the Latitude be contrary, then the Declination muſt be contrary, and the Points of the Compaſs contrary; that is to ſay, North Declination muſt be South, and South Declination muſt be North; and S. by W. muſt be N. by W, and S. S. W. muſt be N. N. W. and S. W. by S. muſt be N. W. by N. and ſo for any other Point, as in this following Table, A Table of Points equally diſtant from Noon, both in North and South Latitude; either before or after Noon.

North Latitude.		South Latitude.	
Forenoon.	Afternoon.	Forenoon.	Afternoon.
South.	*South.*	*North.*	*North.*
S. by *E.*	*S.* by *W.*	*N.* by *E.*	*N.* by *W.*
S. S. E.	*S. S. W.*	*N. N. E.*	*N. N. W.*
S. E. by *S.*	*S. W.* by *S*	*N. E.* by *N.*	*N. W.* by *N.*
South Eaſt.	*South Weſt.*	*North Eaſt*	*North Weſt.*
S. E. by *E.*	*S. W.* by *W.*	*N. E.* by *E.*	*N. W.* by *W.*
E. S. E.	*W. S. W.*	*E. N. E.*	*W. N. W.*
E. by *S.*	*W.* by *S.*	*E.* by *N.*	*W.* by *N.*
Eaſt	*Weſt*	*Eaſt*	*Weſt*
E. by *N.*	*W.* by *N.*	*E.* by *S.*	*W.* by *S.*
E. N. E.	*W. N. W.*	*E. S. E.*	*W. S. W.*
N. E. by *E.*	*N. W.* by *W.*	*S. E.* by *E.*	*S. W.* by *W.*
N. E.	*North Weſt.*	*South Eaſt*	*S. W.*
N. E. by *N.*	*N. W.* by *N.*	*S. E.* by *S.*	*S. W.* by *S.*
N. N. E.	*N. N. W.*	*S. S. E.*	*S. S. W.*
N. by *E.*	*N.* by *W.*	*S.* by *E.*	*S.* by *W.*
North	*North*	*South.*	*South.*

To find the Hour of the Night by the Stars and the Table of the Sun Dial.

BY theſe Tables you may find the Hour of the Night, by the bearing of any known Star, whoſe Declination doth not exceed the Sun's greateſt Declination; after this manner.

Find the time of the Star's coming to the Meridian on the day propoſed; then if the Star be on the Eaſt ſide of the Meridian, ſubtract thoſe hours and minutes which theſe Tables ſhew, from the time of the Star's coming to the Meridian, the Remainder is the hour of the Night. But if the Star be on the Weſt-ſide of the Meridian then add thoſe hours and minutes aboveſaid to the time of the Star's coming to the Meridian, the Sum is the hour of the Night.

To find a Star's coming on or to the Meridian, ſee the

Sea-mans Kalendar, in the Uſes of the Tables of the Sun's and Stars Right Aſcenſion, page 91, 92, 93, *&c.*

Example 8. Admit the *6th* day of *October*, in the Latitude 40 deg. 00 min. North, I obſerve the *Bull's Eye* to be S. E. I demand the hour of the Night?

The *6th* day of *October*, the *Bull's Eye* cometh on the Meridan at 45 minutes paſt two a Clock in the Morning; this Star's Declination is 15 deg. 48 min. North; therefore in the Table that belongs to 40 deg. ſeek in the Head of the Table the Declination, by the ſide, the Point of the Compaſs, and in the common Angle of meeting is 1 hour 31 min. which ſubtract from 2 hours 45 min. the Star's Southing, the Remainder 1 h. 14 m. is the hour of the Night deſired. But if this Star had born S. W. you muſt have added, and then the hour would have been 16 minutes paſt 4 a Clock in the Morning.

The Operation.

	h. m.
The time of the Star's being on the Meridian	2, 45 m.
His diſtance from the Merid. either at S. E. or S. W.	1, 31
The time of the Night, the Star being S. E.	1, 14 m.
The time of the Night the Star being S. W.	4, 16 m.

Example 9. Admit the *5th* day of *November*, in Latitude 45 d. 00 m. North, and I ſee the *Lyon's Tail* upon the E. S. E. Pont of the Compaſs, having Declination 16 d. 25 m. N. I demand the hour of the Night?

	h. m.
The time of this Star's being on the Meridian	08, 09 m.
His diſtance from the Meridian	03, 00 m.
Time of the Night the Star is E. S. E.	05, 09 m.
Time of the Night the Star is W. S. W.	11, 09 m.

Note; If the Compaſs hath Variation, you muſt allow for the Variation: But if you will uſe this following Inſtrument I call a Rectifier, you need not reckon which way the Varition is, either Eaſtward or Weſtward; for this Inſtrument will do it ſo plain, that you cannot be miſtaken, as is ſhewn in the following part of this Book: But for the preſent I will only give you one Propoſition, and apply it upon the Rectifier, which is as followeth.

Admit in Latitude 47 deg. 00 min. North, the Sun being in one of the Equinoctial Points, (at which time he hath no Declination) I obſerve the Sun to riſe upon the E. S. E. Point of the Compaſs; I demand the Variation?

The Sun hath no Declination in any Latitude; if there be no variation, the Sun will riſe at Eaſt, and ſet at Weſt; but according to the foregoing Propoſition, the Sun did riſe at E. S. E. therefore there is two Points Variation.

The Deſcription of the Rectifier.

THis Inſtrument containeth two Circles or Compaſſes one within the other; but as it is made in Wood, the one moveth upon the other; ſo that the inward or upper Circle, repreſenteth the Compaſs that you ſteer by, which is ſubject to Variation; but the outward or under Circle, repreſenteth a true Compaſs that never varieth. And by it you may readily rectify your Compaſs, when it doth vary; thus:

Always bring the true Point of Riſing or Setting on the outward or under Compaſs, to touch the falſe Point of Riſing or Setting on the inward or upper Compaſs, there let the Inſtrument ſtand.

As in this foregoing Propoſition: The Eaſt-Point is the true point of riſing, and the E. S. E. Point is the falſe Point of riſing; therefore bring the Eaſt-point on the outward or under Compaſs to touch the E. S. E. Point on the inward or upper Compaſs.

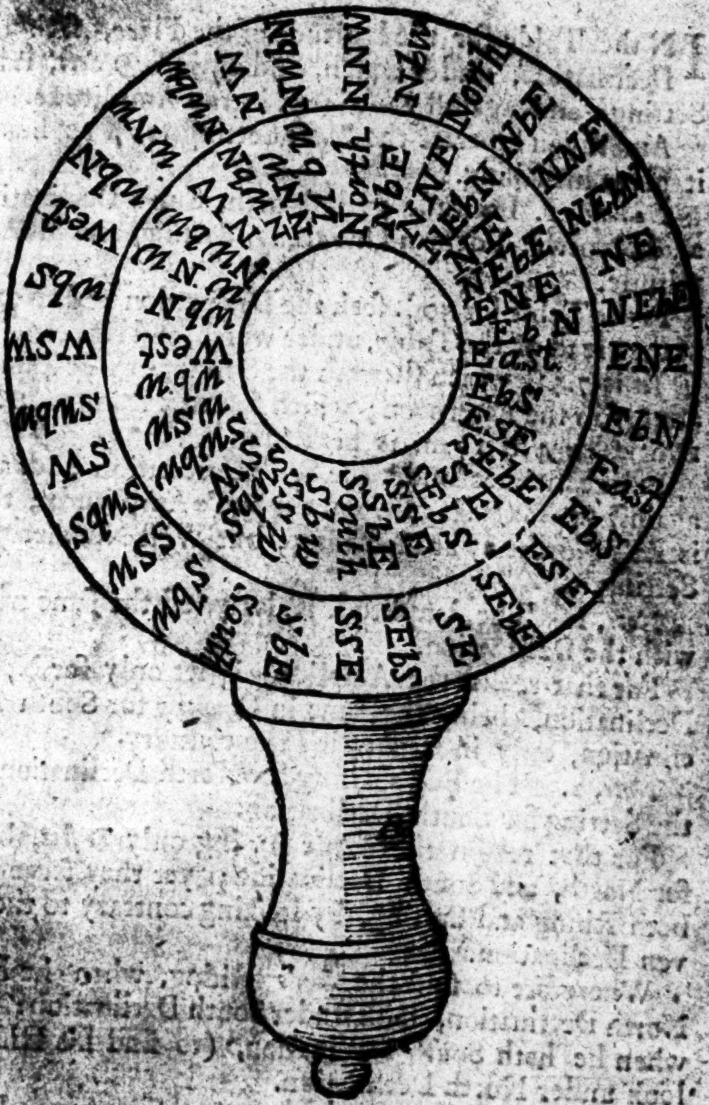
Thus the points that are upon the outward Compaſs, do explain the Points that are upon the inward Compaſs: So that according to this Obſervation the N. N. E. Point on your Compaſs, is the true North Point; and the N. is the true N. N. W. and the N. W. is true W. N. W. and the Weſt is the true W. S. W. Point; as plainly appears by the Rectifier

Note; The true Points are always on the outward Circle or Compaſs.

This Inſtrument in Wood, is larger than this Figure, and there the Points be divided into Halves and Quarters; as alſo each Compaſs (in ſome) is divided into 360 deg. numbred from the North, and South, both ways toward the Eaſt and Weſt, ending in 90 degrees.

A

A RECTIFIER.


North
NbE
NNE
NEbN
NE
NEbE
ENE
EbN
East
EbS
ESE
SEbE
SE
SEbS
SSE
SbE
South
Sbw
SSW
SWbS
SW
SWbW
WSW
Wbs
West
WbN
WNW
NWbW
NNW

To find the Sun's Riſing, Setting, or Amplitude by the Tables of Sun Dials.

IN the Table for the Latitude of the Place, ſeek the Declination, under which, and againſt ⊙ *Sets*, is his Setting; and againſt *Sun's Amp.* is the Amplitude.

And if you ſubtract the *Sun's* Setting from 12 hours, it gives his Riſing.

Example 1. Latitude 50 d. North, Sun's Declination 23 d. North: I demand his riſing, Setting, and his Amplitude.

In the Table for 50d. ſeek the Declination 20d. North at the Head of the Table, under which, and right againſt ⊙ *ſet* is 7.43, which ſheweth the Sun ſetteth at 43min. after 7 in the Afternoon; which ſubtract from 12 h. the remainder 4 h. 17 m. is his Riſing.

In like manner under the Sun's Declination 20d. and againſt *Sun's Amp.* is 32d. 9m. the Sun's Amplitude; that is Eaſt Northerly at his Riſing; but Weſt Northerly at Setting.

Note, 1. The Amplitude is always of the ſame name with the Declination.

For that reaſon the Amplitude is ſet only for North Declination, being the ſame in *Quantity* for South Declination, only in *Quality* it's the contrary.

Note, 2. The Sun's Riſing for North Declination, is the Setting for South Declination.

For that reaſon the Table having only ⊙ *ſets*, both for North, and South Declination; yet they ſerve for both Riſing and Setting, by looking contrary to the given Declination.

Wherefore to find the *Sun's* Riſing, when he hath North Declination, look under South Declination; and when he hath South Declination, (to find his Riſing) look under North Declination.

Note, 3. In South Latitude with South Declination, alſo in South Latitude with North Declination; the Sun's Riſing and Setting is the ſame as in North Latitude with *North Declination*, as alſo in North Latitude with *South Declination*.

Therefore theſe Tables are as uſeful in *South Latitude*, as in *North Latitude*, if *North Declination*, in theſe Tables be counted for South, and South for North.

Note, 4. The Riſing, Setting and Amplitude of any Star whoſe *Declination* doth not exceed the Sun's greateſt *Declination*) may be found by theſe Tables; provided its Southing or time of the Star's coming to or on the Meridian be known.

For the time of *Sun ſetting* in theſe Tables for any Latitude, is a Star's half Continuance above the Horizon, having equal Declination and of the ſame kind with the Sun, for the ſame Latitude.

Therefore the half Contniuance of a Star above the Horizon, (found in theſe Tables as before directed) added to, and ſubtracted from the Star's coming to or on the Meridian; the firſt is the Star's ſetting, the latter its riſing.

Examples of this Nature you will find in the Uſe of the next Tables of Semidiurnal and Seminocturnal Arches, to which the Reader is referr'd.

The Amplitude of a Star by the foregoing Tables, is found as the Amplitude of the Sun, which is more fully treated on in the Uſe of the Tables of Amplitude.

Aſtronomical TABLES *of* Semidiurnal *and* Seminocturnal Arches, *Shewing the true Time of the* SUN's *Riſing and Setting, with the Length of the Day and Night, for any Day of the Year; fitting all Places in the World, whoſe* Pole *is not elevated above 60 Degrees; either North or South; and to laſt with Exactneſs, as long as God upholdeth the Courſe of Nature.*

A Table ſhewing the Semidiurnal-Arch, or the Time of Sun-ſetting, when the Sun hath North Declination; and the Seminocturnal-Arch, or the Time of Sun-riſing, when the Sun hath South Declination.

The Degrees of Latitude,

Sun's Decl.	1		2		3		4		5		6	
	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.
0	6	00	6	00	6	00	6	00	6	00	6	00
1	6	00	6	00	6	00	6	00	6	00	6	00
2	6	00	6	00	6	00	6	00	6	01	6	01
3	6	00	6	00	6	01	6	01	6	01	6	01
4	6	00	6	00	6	01	6	01	6	01	6	02
5	6	00	6	00	6	01	6	01	6	02	6	02
6	6	00	6	01	6	01	6	02	6	02	6	03
7	6	00	6	01	6	01	6	02	6	02	6	03
8	6	00	6	01	6	02	6	02	6	03	6	03
9	6	01	6	01	6	02	6	03	6	03	6	04
10	6	01	6	01	6	02	6	03	6	04	6	04
11	6	01	6	01	6	02	6	03	6	04	6	05
12	6	01	6	02	6	02	6	03	6	04	6	05
13	6	01	6	02	6	03	6	04	6	05	6	06
14	6	01	6	62	6	03	6	04	6	05	6	06
15	6	01	6	02	6	03	6	04	6	05	6	06
16	6	01	6	02	6	03	6	05	6	06	6	07
17	6	01	6	02	6	04	6	05	6	06	6	07
18	6	01	6	03	6	04	6	05	6	07	6	08
19	6	01	6	03	6	04	6	05	6	07	6	08
20	6	01	6	03	6	04	6	06	6	07	6	09
21	6	02	6	03	6	05	6	06	6	08	6	09
22	6	02	6	03	6	05	6	06	6	08	6	10
23	6	02	6	03	6	05	6	07	6	09	6	10
23,31	6	02	6	04	6	05	6	07	6	09	6	11

Degrees of Declination.

A Table ſhewing the Semidiurnal-Arch or the Time of Sun-ſetting, when the Sun hath North Declination; and the Seminocturnal-Arch, or Time of Sun-riſing when the Sun hath South Declination.

The Degrees of Latitude.

Sun's Decl.	7		8		9		10		11		12	
Degrees of Declination.	H.	M.	H.	M	H.	M.	H.	M.	H.	M.	H.	M.
0	6	00	6	00	6	00	6	00	6	00	6	00
1	6	00	6	00	6	01	6	01	6	01	6	01
2	6	01	6	01	6	01	6	01	6	02	6	02
3	6	01	6	02	6	02	6	02	6	02	6	03
4	6	02	6	02	6	02	6	03	6	03	6	03
5	6	02	6	03	6	03	6	04	6	04	6	04
6	6	03	6	03	6	04	6	04	6	05	6	05
7	6	03	6	04	6	04	6	05	6	05	6	06
8	6	04	6	04	6	05	6	06	6	06	6	07
9	6	04	6	05	6	06	6	06	6	07	6	08
10	6	05	6	06	6	06	6	07	6	08	6	09
11	6	05	6	06	6	07	6	08	6	09	6	09
12	6	06	6	07	6	08	6	09	6	09	6	10
13	6	06	6	07	6	08	6	09	6	10	6	11
14	6	07	6	08	6	09	6	10	6	11	6	12
15	6	08	6	09	6	10	6	11	6	12	6	13
16	6	08	6	09	6	10	6	12	6	13	6	14
17	6	09	6	10	6	11	6	12	6	14	6	15
18	6	09	6	10	6	12	6	13	6	14	6	16
19	6	10	6	11	6	13	6	14	6	15	6	17
20	6	10	6	12	6	14	6	15	6	16	6	18
21	6	11	6	12	6	14	6	16	6	17	6	19
22	6	11	6	13	6	15	6	16	6	18	6	20
23	6	12	6	14	6	15	6	17	6	19	6	21
23,31	6	12	6	14	6	16	6	18	6	19	6	22

A Table ſhewing the Semidiurnal-Arch or the Time of Sun-ſetting, when the Sun hath North Declination; and the Seminocturnal-Arch, or Time of Sun-riſing when the Sun hath South Declination.

The Degrees of Latitude.

Sun's Decl.	13		14		15		16		17		18	
Degrees of Declination.	H.	M.	H.	M	H.	M.	H.	M.	H.	M.	H.	M.
0	6	00	6	00	6	00	6	00	6	00	6	00
1	6	01	6	01	6	01	6	01	6	01	6	01
2	6	02	6	02	6	02	6	02	6	02	6	02
3	6	03	6	03	6	03	6	03	6	04	6	04
4	6	04	6	04	6	04	6	05	6	05	6	05
5	6	05	6	05	6	05	6	06	6	06	6	06
6	6	06	6	06	6	06	6	07	6	07	6	08
7	6	06	6	07	6	07	6	08	6	09	6	09
8	6	07	6	08	6	09	6	09	6	10	6	10
9	6	08	6	09	6	10	6	10	6	11	6	12
10	6	09	6	10	6	11	6	12	6	12	6	13
11	6	10	6	11	6	12	6	13	6	13	6	14
12	6	11	6	12	6	13	6	14	6	15	6	16
13	6	12	6	13	6	14	6	15	6	16	6	17
14	6	13	6	14	6	15	6	16	6	17	6	19
15	6	14	6	15	6	16	6	18	6	19	6	20
16	6	15	6	16	6	18	6	19	6	20	6	21
17	6	16	6	17	6	19	6	20	6	21	6	23
18	6	17	6	19	6	20	6	21	6	23	6	24
19	6	18	6	20	6	21	6	23	6	24	6	26
20	6	19	6	21	6	22	6	24	6	25	6	27
21	6	20	6	22	6	24	6	25	6	27	6	29
22	6	21	6	23	6	25	6	27	6	28	6	30
23	6	22	6	24	6	26	6	28	6	30	6	32
23,31	5	23	6	25	6	17	6	29	6	31	5	33

A Table ſhewing the Semidiurnal-Arch, or the Time of Sun-ſetting, when the Sun hath North Declination; and the Seminocturnal-Arch, or the Time of Sun-riſing, when the Sun hath South Declination.

The Degrees of Latitude.

Sun's Decl. Degrees of Declination.	19		20		21		22		23		24	
	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.
0	6	00	6	00	6	00	6	00	6	00	6	00
1	6	01	6	01	6	01	6	02	6	02	6	02
2	6	03	6	03	6	03	6	03	6	03	6	03
3	6	04	6	04	6	05	6	05	6	05	6	05
4	6	05	6	09	6	06	6	06	6	07	6	07
5	6	07	6	07	6	08	6	08	6	09	6	09
6	6	08	6	09	6	09	6	10	6	10	6	11
7	6	10	6	10	6	11	6	11	6	12	6	13
8	6	11	6	12	6	12	6	13	6	14	6	14
9	6	13	6	13	6	14	6	15	6	15	6	16
10	6	14	6	15	6	16	6	16	6	17	6	18
11	6	15	6	16	6	17	6	18	6	19	6	20
12	6	17	6	18	6	19	6	20	6	21	6	22
13	6	18	6	19	6	20	6	21	6	23	6	24
14	6	20	6	21	6	22	6	23	6	24	6	25
15	6	21	6	22	6	24	6	25	6	26	6	27
16	6	23	6	24	6	25	6	27	6	28	6	29
17	6	24	6	25	6	27	6	28	6	30	6	31
18	6	26	6	27	6	29	6	30	6	32	6	33
19	6	27	6	29	6	30	6	32	6	34	6	35
20	6	28	6	30	6	32	6	34	6	36	6	37
21	6	30	6	32	6	34	6	36	6	37	6	39
22	6	31	6	33	6	35	6	37	6	39	6	41
23	6	33	6	35	6	37	6	39	6	41	6	43
23,31	6	34	6	36	6	38	6	40	6	43	6	45

A Table ſhewing the Semidiurnal-Arch, or the Time of Sun-ſetting, when the Sun hath North Declination; and the Seminocturnal-Arch, or the Time of Sun-riſing, when the Sun hath South Declination.

The Degrees of Latitude.

Degrees of Declination

Sun's Decl.	25		26		27		28		29		30	
	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.
0	6	00	6	00	6	00	6	00	6	00	6	00
1	6	02	6	02	6	02	6	02	6	02	6	02
2	6	04	6	04	6	04	6	04	6	04	6	05
3	6	06	6	06	6	06	6	06	6	07	6	07
4	6	07	6	08	6	08	6	09	6	09	6	09
5	6	09	6	10	6	10	6	11	6	11	6	12
6	6	11	6	12	6	12	6	13	6	13	6	14
7	6	13	6	14	6	14	6	15	6	16	6	16
8	6	15	6	16	6	16	6	17	6	18	6	19
9	6	17	6	18	6	19	6	19	6	20	6	21
10	6	19	6	20	6	21	6	22	6	23	6	23
11	6	21	6	22	6	23	6	24	6	25	6	26
12	6	23	6	24	6	25	6	26	6	27	6	28
13	6	25	6	26	6	27	6	28	6	29	6	31
14	6	27	6	28	6	29	6	30	6	32	6	33
15	6	29	6	30	6	31	6	33	6	34	6	36
16	6	31	6	32	6	34	6	35	6	37	6	38
17	6	33	6	34	6	36	6	37	6	39	6	41
18	6	35	6	36	6	38	6	40	6	42	6	43
19	6	37	6	39	6	40	6	42	6	44	6	46
20	6	39	6	41	6	43	6	45	6	47	6	48
21	6	41	6	43	6	45	6	47	6	49	6	51
22	6	43	6	45	6	48	6	50	6	52	6	54
23	6	46	6	48	6	50	6	52	6	54	6	57
23,31	6	47	6	49	6	51	6	53	6	56	6	59

A Table ſhewing the Semidiurnal-Arch, or the Time of Sun-ſetting, when the Sun hath North Declination; and the Seminocturnal-Arch, or the Time of Sun-riſing, when the Sun hath South Declination.

Sun's Decl. Degrees of Declination.	The Degrees of Latitude.											
	31		32		33		34		35		36	
	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.
0	6	00	6	00	6	00	6	00	6	00	6	00
1	6	02	6	02	6	03	6	03	6	03	6	03
2	6	05	6	05	6	05	6	05	6	06	6	06
3	6	07	6	08	6	08	6	08	6	08	6	09
4	6	10	6	10	6	10	6	11	6	11	6	12
5	6	12	6	13	6	13	6	14	6	14	6	15
6	6	15	6	15	6	16	6	16	6	17	6	18
7	6	17	6	18	6	18	6	19	6	20	6	20
8	6	19	6	20	6	21	6	22	6	23	6	23
9	6	22	6	23	6	24	6	25	6	25	6	26
10	6	24	6	25	6	26	6	27	6	28	6	29
11	6	27	6	28	6	29	6	30	6	31	6	32
12	6	29	6	31	6	32	6	33	6	34	6	36
13	6	32	6	33	6	34	6	36	6	37	6	39
14	6	34	6	36	6	37	6	39	6	40	6	42
15	6	37	6	39	6	40	6	42	6	43	6	45
16	6	40	6	41	6	43	6	45	6	46	6	48
17	6	42	6	44	6	46	6	48	6	49	6	51
18	6	45	6	47	6	49	6	51	6	53	6	55
19	6	48	6	50	6	52	6	54	6	56	6	58
20	6	51	6	53	6	55	6	57	6	59	7	01
21	6	53	6	56	6	58	7	00	7	02	7	05
22	6	56	6	58	7	01	7	03	7	06	7	08
23	6	59	7	01	7	04	7	06	7	09	7	12
23,31	7	01	7	03	7	06	7	08	7	11	7	14

A Table ſhewing the Semidiurnal-Arch, or the Time of Sun-ſetting, when the Sun hath North Declination; and the Seminocturnal-Arch, or the Time of Sun-riſing, when the Sun hath South Declination.

The Degrees of Latitude.

Sun's Dech. Degrees of Declination.	37		38		39		40		41		42	
	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.
0	6	00	6	00	6	00	6	00	6	00	6	00
1	6	03	6	03	6	03	6	03	6	03	6	04
2	6	06	6	06	6	06	6	07	6	07	6	07
3	6	09	6	09	6	10	6	10	6	10	6	11
4	6	12	6	13	6	13	6	13	6	14	6	14
5	6	15	6	16	6	16	6	17	6	17	6	18
6	6	18	6	19	6	20	6	20	6	21	6	22
7	6	21	6	22	6	23	6	24	6	25	6	25
8	6	24	6	25	6	26	6	27	6	28	6	29
9	6	27	6	28	6	29	6	31	6	32	6	33
10	6	31	6	32	6	33	6	34	6	35	6	37
11	6	34	6	35	6	36	6	38	6	39	6	40
12	6	37	6	38	6	40	6	41	6	43	6	44
13	6	40	6	42	6	43	6	45	6	46	6	48
14	6	43	6	45	6	47	6	48	6	50	6	52
15	6	47	6	48	6	50	6	52	6	54	6	56
16	6	50	6	52	6	54	6	56	6	58	7	00
17	6	53	6	55	6	57	7	00	7	02	7	04
18	6	57	6	59	7	01	7	03	7	06	7	08
19	7	00	7	02	7	05	7	07	7	10	7	12
20	7	04	7	06	7	09	7	11	7	14	7	17
21	7	07	7	10	7	12	7	15	7	18	7	21
22	7	11	7	14	7	16	7	19	7	22	7	25
23	7	15	7	17	7	20	7	23	7	27	7	30
23,31	7	17	7	19	7	22	7	26	7	29	7	32

A Table ſhewing the Semidiurnal-Arch, or the Time of Sun-ſetting, when the Sun hath North Declination; And the Seminocturnal-Arch, or the Time of Sun-riſing, when the Sun hath South Declination.

The Degrees of Latitude.

Sun's Decl.	43		44		45		46		47		48	
Degrees of Declination.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.
0	6	00	6	00	6	00	6	00	6	00	6	00
1	6	04	6	04	6	04	6	04	6	04	6	04
2	6	07	6	08	6	08	6	08	6	09	6	09
3	6	11	6	12	6	12	6	12	6	13	6	13
4	6	15	6	15	6	16	6	17	6	17	6	18
5	6	19	6	19	6	20	6	21	6	22	6	22
6	6	22	6	23	6	24	6	25	6	26	6	27
7	6	26	6	27	6	28	6	29	6	30	6	31
8	6	30	6	31	6	32	6	33	6	35	6	36
9	6	34	6	35	6	36	6	38	6	39	6	41
10	6	38	6	39	6	41	6	42	6	44	6	45
11	6	42	6	43	6	45	6	46	6	48	6	50
12	6	46	6	47	6	49	6	51	6	53	6	55
13	6	50	6	52	6	53	6	55	6	57	6	59
14	6	54	6	56	6	58	7	00	7	02	7	04
15	6	58	7	00	7	02	7	04	7	07	7	09
16	7	02	7	04	7	07	7	09	7	12	7	14
17	7	06	7	09	7	11	7	14	7	17	7	19
18	7	11	7	13	7	16	7	19	7	22	7	25
19	7	15	7	18	7	21	7	24	7	27	7	30
20	7	19	7	22	7	25	7	29	7	32	7	35
21	7	24	7	27	y	30	7	34	7	37	7	41
22	7	28	7	32	7	35	7	39	7	43	7	47
23	7	33	7	37	7	40	7	44	7	48	7	53
23,31	7	36	7	40	7	43	7	47	7	51	7	56

A Table ſhewing the Semidiurnal-Arch, or the Time of Sun-ſetting, when the Sun hath North Declination; And the Seminocturnal-Arch, or the Time of Sun-riſing, when the Sun hath South Declination.

The Degrees of Latitude.

Sun's Decl.	49		50		51		52		53		54	
Degrees of Declination.	H.	M.	H.	M.	H-	M.	H.	M.	H,	M.	H.	M.
0	6	00	6	00	6	00	6	00	6	00	6	00
1	6	05	6	05	6	05	6	05	6	05	6	06
2	6	09	6	10	6	10	6	10	6	11	6	11
3	6	14	6	14	6	15	6	15	6	16	6	17
4	6	18	6	19	6	20	6	21	6	21	6	22
5	6	23	6	24	6	25	6	26	6	27	6	28
6	6	28	6	29	6	30	6	31	6	32	6	33
7	6	32	6	34	6	35	6	36	6	38	6	39
8	6	37	6	39	6	40	6	41	6	43	6	45
9	6	42	6	44	6	45	6	47	6	49	6	59
10	6	47	6	49	6	50	6	52	6	54	6	56
11	6	52	6	54	6	56	6	58	7	00	7	02
12	6	57	6	59	7	01	7	03	7	06	7	08
13	7	02	7	04	7	06	7	09	7	11	7	14
14	7	07	7	09	7	12	7	14	7	17	7	20
15	7	12	7	14	7	17	7	20	7	23	7	27
16	7	17	7	20	7	23	7	26	7	29	7	33
17	7	22	7	25	7	29	7	32	7	36	7	40
18	7	28	7	31	7	35	7	38	7	42	7	46
19	7	33	7	37	7	41	7	45	7	49	7	53
20	7	39	7	43	7	47	7	51	7	56	8	00
21	7	45	7	49	7	53	7	58	8	02	8	08
22	7	51	7	55	8	00	8	05	8	10	8	15
23	7	57	8	02	8	06	8	12	8	17	8	23
23,31	8	00	8	05	8	10	8	16	8	21	8	27

A Table ſhewing the Semidiurnal-Arch, or the Time of Sun ſetting, when the Sun hath North Declination; and the Seminocturnal-Arch, or the Time of Sun-riſing, when the Sun hath South Declination.

The Degrees of Latitude.

Sun's Decl.	55		56		57		58		59		60	
	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.
0	6	00	6	00	6	00	6	00	6	00	6	00
1	6	06	6	06	6	06	6	06	6	07	6	07
2	6	11	6	12	6	12	6	13	6	13	6	14
3	6	17	6	18	6	19	6	19	6	20	6	21
4	6	23	6	24	6	25	6	26	6	27	6	28
5	6	29	6	30	6	31	6	32	6	33	6	35
6	6	35	6	36	6	37	6	39	6	40	6	42
7	6	40	6	42	6	44	6	45	6	47	6	49
8	6	46	6	48	6	50	6	52	6	54	6	56
9	6	52	6	54	6	56	6	59	7	01	7	04
10	6	58	7	00	7	03	7	06	7	08	7	11
11	7	04	7	07	7	10	7	13	7	16	7	19
12	7	11	7	13	7	16	7	20	7	23	7	26
13	7	17	7	20	7	23	7	27	7	30	7	34
14	7	23	7	27	7	30	7	34	7	38	7	42
15	7	30	7	34	7	38	7	42	7	46	7	51
16	7	37	7	41	7	45	7	49	7	54	7	59
17	7	44	7	48	7	52	7	57	8	03	8	08
18	7	51	7	55	8	00	8	05	8	11	8	17
19	7	58	8	03	8	08	8	14	8	20	8	26
20	8	05	8	10	8	16	8	22	8	29	8	36
21	8	13	8	19	8	25	8	32	8	39	8	47
22	8	21	8	27	8	34	8	41	8	49	8	58
23	8	29	8	36	8	43	8	51	9	00	9	09
23,31	8	34	8	41	8	48	8	56	9	05	9	15

Degrees of Declination.

The USE of the foregoing TABLES.

To find the Time of the Sun's Riſing and Setting, with the Length of the Day and Night, by theſe Tables of Semidiurnal and Seminocturnal-Arches.

FIRST, ſeek the Sun's Declination, in the Tables of Declination, for the Day propoſed, with which enter the Table of Semidiurnal and Seminocturnal-Arches, finding the *Latitude* of the Place, in the head of the Table, and the Degree of the Sun's Declination in the firſt Column on the Left-hand; and in the common Angle of Meeting is the Semidiurnal-Arch, if the Sun hath *North Declination*; or the Seminocturnal-Arch if the Sun hath *South Declination.*

Example 1. For Illuſtration hereof, let it be requir'd to find the Time of the Sun's Riſing and Setting, with the Length of the Day and Night for the 23d Day of *April* 1716, in Latitude 46 deg. *North.*

At which Time the Sun's Declination is 16 deg. 1 m. *North*, with which enter the Table, as before is declared, and the Semidiurnal-Arch is 7 Hours 9 Min. the true Time of Sun-ſetting, whoſe Complement to twelve Hours, is the Seminocturnal-Arch, or the Time of Sun-riſing, and is 4 Hours 51 Min. Double the Semidiurnal-Arch, you have the Length of the Day; Double the Seminocturnal-Arch, the Aggregate is the Length of the Night, See the Work following.

	H.	M.
The Semidiurnal-Arch, or Time of Sun-ſetting	12 07	00 09
The Complement to twelve Hours	04	51

Is the Seminocturnal-Arch, or Time of Sun-Riſing, Latitude 46 Degrees.

The

	H.	M.
The Semidiurnal Arch doubled	07	09
	07	09
The Length of the Day, *April* 23, 1716	14	18
The Seminocturnal Arch doubled	04	51
	04	51
Length of the Night, *April* 23, 1716,	09	42

Example 2. But when the Sun hath 16 deg. 1 min. *South* Declination in this Latitude of 46 deg.

Then the Day-Arch will be equal to the Night Arch, and the Night Arch will be equal to the Day Arch.

As on *October* 26, 1716, the Sun hath 16 deg. 2 min. *South* Declination, then the Time of the Sun's Riſing is 7 hours 9 min. his Setting 4 hours 51 min. the Length of the Day 9 hours 42 min. and the Length of the Night 14 hours 18 min.

Examp. 3. Let it be required to find the Time of the Sun's Riſing and Setting, with the Length of the Day and Night, for the 15th day of *December* 1716, in Latitude 53 deg. *North*; at which Time the Sun's Declination is 23 deg. 27 min. *South.*

	H.	M.
The Seminocturnal-Arch, or the Time of Sun-Riſing	12	00
	08	21
The Complement to 12 Hours	03	39

Is the Semidiurnal-Arch, or Time of Sun-ſetting.

	H.	M.
The Semidiurnal-Arch doubled	03	39
	03	39
Length of the Day, *December* 15, 1716	07	18
The Seminocturnal-Arch doubled	08	21
	08	21
The Length of the Night *December*, 15, 1716.	16	42

Theſe Tables will ſerve as well in *South* Latitude as in *North*, with this Alteration only. When in *South* Latitude, then uſe *South* Declination there, as you do *North* Declination here.

For then theſe Tables ſhew the Semidiurnal-Arch, or the Time of Sun-ſetting, when the Sun hath *South* Declination; and the Seminocturnal-Arch, or the Time of Sun-riſing, when the Sun hath *North* Declination.

Example 4. Let it be required to find the Time of the Sun's Riſing and Setting, with the Length of the Day and Night, for the 23d Day of *April* 1716, in Latitude 46 deg. *South*.

At which Time the Sun's Declination 16 deg. 1 min. *North*, with which enter the Table, and the Seminocturnal-Arch is 7 hours 9 min. the Time of Sun-riſing, whoſe Complement to 12 hours, is the Semidiurnal-Arch, or the Time of Sun-ſetting, which is at 51 min. paſt 4 of the Clock.

	H.	M.
	12	00
The Seminocturnal-Arch doubled	07	09
	07	09
The Length of the Night, *April* 23, 1716, Latitude 46 deg. *South*	14	18
The Semidiurnal Arch doubled	04	51
	04	51
The Length of the Day for the 23d of *April* 1716, Latitude 46 deg. *South*	09	42

Example 5. Let it be required to find the Time of the Sun's Riſing and Setting, with the Length of the Day and Night, for the 15th of *December* 1716, in Latitude 53 deg. *South*. At which Time the Sun's Declination is 23 deg. 27 min. *South*; with which enter the Table of Semidiurnal-Arches, *&c.* and you will find as follows.

H. M

	H.	M.
The Semidiurnal Arch, or Time of Sun-ſetting.	12 08	00 21
The Seminocturnal-Arch, or the Time of Sun-riſing.	03	39
The Length of the Day,	16	42
Length of the Night, *Decemb.* 15, 1716, Latitude 53 degrees *South*,	07	18

To find the Time of a Star's Riſing or Setting.

BY theſe Tables the Time of the Riſing and Setting of all Stars in the Heavens, whoſe Declinations doth not exceed the Sun's greateſt Declination, in any Latitude that the Tables contain, and at any Time of the Year, are found in this manner.

If the Star hath *North* Declination, and you in *North* Latitude, look for the Latitude in the head of the Table, the Declination on the Left-hand; and in the common Angle of Meeting, is the *Star*'s Semidiurnal-Arch, or half the Time that *Star* doth continue above the Horizon in that Latitude; or the Diſtance of Time that *Star* is in going from the Horizon to the Meridian on the *Eaſt-ſide*; likewiſe from the Meridian to the Horizon on the *Weſt-ſide* of the Meridian. Now if you ſubtract theſe Hours and Minutes from the Time of the *Star*'s coming to the Meridian, the Remainder will be the Time of the *Star*'s Riſing; and if you add, the Sum will be the true Time of the *Star*'s Setting.

Example 6. Let it be required to find the Time of the Riſing and Setting of the *Bull's-Eye*, *Novemb.* 18, in the Latitude of 42 deg. North; The Declination of this *Star* is 15 deg. 47 min. North; the 18th Day of *November* this *Star* cometh on the Meridian at 12 a Clock at Night.

H. M.

	H.	M.
The Time of the Star's Southing	12	00
The Semidiurnal-Arch, ſubtract	06	59
Time of the Star's Riſing in the Evening	05	01
Time of the Star's ſetting in the Morning	06	59

Note, 1. If the Sum of the Addition exceeds 12 hours, caſt away 12 hours.

2. And when you can't ſubtract, add 12 hours to the Star's Southing, and then ſubtract, what remains is its ſetting.

Example 7. I deſire to know the Time of the Riſing and Setting of the *Bull's Eye*, the 18th Day of *November*, in the Latitude of 13 deg. *North*, The Declination of the *Bull's Eye*, is 15 deg. 47 min. *North*.

	H.	M.
The Time of its Southing	12	00
The Semidiurnal Arch, ſubtract	06	15
The Time of his Riſing in the Evening	05	45
The Time of his Setting in the Morning	06	15

If the Star hath *Sauth* Declination, and you in *North* Latitude, look (as before) the Latitude in the Head of the Table, the Declination on the Left-ſide; and in the common Angle of Meeting is the Star's Seminocturnal-Arch, which ſubtract from 12 Hours, the Remainder is the Star's Semidiurnal Arch, or half the Time that Star doth continue above the Horizon in that Latitude, therefore ſubtract thoſe Hours and Minutes from the Time of the Star's coming to the Meridian, (adding 12 Hours to the Star's Southing, it otherwiſe Subtraction cannot be made) the Remainder will be the Time of the Star's Riſing; and if you add, the Sum will be the Time of the Star's Setting.

Example 8. Let it be required to find the Time of the Riſing and Setting of the bright Star in the *Great Dog's Mouth*, the 15th Day of *November*, in the Latitude of 50 deg. *North*. The Declination of the *Great Dog's Mouth*, is 16 deg. 15 min. *South*, and its Southing, is two hours 26 min. in the Morning the 15th of *November*.

	H.	M.
The Time of this Star's Southing	02	26
To it add	12	00
The Sum is	14	26
The Seminocturnal-Arch by the Table, is	07	21
Which Subtract from	12	00
The Remainder is the Semidiurnal-Arch	04	39
Time of Southing with 12 hours added, is	14	26
The Semidiurnal-Arch, ſubtract	04	39
Time of the Star's Riſing in the Evening	09	47
Time of the Star's Setting in the Morning	07	05

Example 9. I deſire to know the Riſing and Setting of the *Great Dog*, the 15th of *November*, in the Latitude of 33 Degrees *North*.

	H.	M.
Time of Southing, with 12 hours added	14	26
The Semidiurnal-Arch	05	22
Time of the Stars Riſing in the Evening	09	04
Time of the Star's Setting in the Morning	07	48

In South *Latitude, to know the Time of the Riſing and Setting of the Stars.*

DO with thoſe Stars that have *North* Declination, in *South* Latitude, as with Stars that have *South* Declination, when in *North* Latitude.

Examp.

Example 10. Let it be required to find the Time of Riſing and Setting of the *Bull's-Eye* the 18th Day of *November*, in the Latitude of 42 deg. *South*.

The Declination of this Star is 15 deg. 47 min. *North*; The 18th Day of *November* this Star cometh upon the Meridian at 12 of the Clock at Night.

	H.	M.
The Seminocturnal-Arch by the Table, is,	06	59
Which ſubtract from	12	00
The Remainder is the Semidiurnal-Arch	05	01
The Time of the Star's Northing is	12	00
The Semidiurnal-Arch, ſubtract	05	01
Time of the Star's Riſing in the Evening	06	59
Time of the Star's Setting in the Morning	05	01

In like manner may the Riſing and Setting of any Star, (whoſe Declination exceedeth not the Sun's greateſt) be found in any Latitude, from the Equinoctial to ſixty Degrees.

ASTRONOMICAL
TABLES
SHEWING
The Point of the Compaſs that the Sun and Stars Riſe and Set with,

Being of excellent Uſe for the ready finding of the Variation of the Compaſs; and may be performed by an ordinary *Meridian-Compaſs*, but more exactly by an *Azimuth Compaſs*.

Fitting all Parts of the World, where the Pole is elevated not above 60 deg. either *North* or *South*

Latitude 0 Degrees.

North Declination.		*Declination*	*South Declination.*	
☉*ri.*	☉*ſet.*	D M	☉*ri.*	☉*ſet.*
Eaſt	Weſt	00.00	Eaſt	Weſt
1		02.49	1	
2		05.37	2	
3		08.26	3	
e *by* n	w *by* n	11.15	e *by* s	w. *by* s
1		14.04	1	
2		16.52	2	
3		19.41	3	
e n e	w n w	22.30	e s e	w s w

Latitude 1 Degree.

North Declination		*Declination*	*South Declination.*	
☉*ri.*	☉*ſet.*	D M	☉*ri.*	☉*ſet.*
Eaſt	Weſt	00.00	Eaſt	Weſt
1		02.49	1	
2		05.37	2	
3		08.26	3	
e *by* n	w *by* n	11.15	e *by* s	w *by* s
1		14.04	1	
2		16.52	2	
3		19.41	3	
e n e	w n w	22.30	e s e	w s w

Latitude 2 Degrees.

North Declination.		*Declination*	*South Declination.*	
☉*ri.*	☉*ſet.*	D M	☉*ri.*	☉*ſet.*
Eaſt	Weſt	00.00	Eaſt	Weſt
1		02.49	1	
2		05.37	2	
3		08.26	3	
e *by* n	w *by* n	11.14	e *by* s	w *by* s
1		14.03	1	
2		16.51	2	
3		19.40	3	
e n e	w n w	22.29	e s e	w s w

Latitude 3 Degrees.

North Declination.		*Declination*	*South Declination.*	
☉*ri.*	☉*ſet.*	D M	☉*ri.*	☉*ſet.*
Eaſt	Weſt	00.00	Eaſt	Weſt
1		02.49	1	
2		05.37	2	
3		08.25	3	
e *by* n	w *by* n	11.14	e *by* s	w *by* s
1		14.03	1	
2		16.51	2	
3		19.39	3	
e n e	w n w	22.27	e s e	w s w

Latitude 4 Degrees.

North Declination.		Declination	South Declination.	
☉ ri.	☉ ſet.	D M	☉ ri.	☉ ſet.
Eaſt	Weſt	00.00	Eaſt	Weſt
1		02.48	1	
2		05.37	2	
3		08.25	3	
e by n	w by n	11.14	e by s	w. by s
1		14.02	1	
2		16.50	2	
3		19.38	3	
e n e	w n w	22.26	e s e	w s w

Latitude 5 Degrees.

North Declination		Declination	South Declination.	
☉ ri.	☉ ſet.	D M	☉ ri.	☉ ſet
Eaſt	Weſt	00.00	Eaſt	Weſt
1		02.48	1	
2		05.37	2	
3		0.824	3	
e by n	w by n	11.12	e by s	w by s
1		14.01	1	
2		16.49	2	
3		19.36	3	
e n e	w n w	22.23	e s e	w s w

Latitude 6 Degrees.

North Declination.		Declination	South Declination.	
☉ ri.	☉ ſet.	D M	☉ ri.	☉ ſet.
Eaſt	Weſt	00.00	Eaſt	Weſt
1		02.48	1	
2		05.36	2	
3		08.23	3	
e by n	w by n	11.11	e by s	w by s
1		13.59	1	
2		16.47	2	
3		19.23	3	
e n e	w n w	22.21	e s e	w s w

Latitude 7 Degrees.

North Declination.		Declination	South Declination.	
☉ ri.	☉ ſet.	D M	☉ ri.	☉ ſet.
Eaſt	Weſt	00.00	Eaſt	Weſt
1		02.48	1	
2		05.35	2	
3		08.20	3	
e by n	w by n	11.09	e by s	w by s
1		13.58	1	
2		16.45	2	
3		19.31	3	
e n e	w n w	22.19	e s e	w s w

Latitude 8 Degrees.

North Declination. ☉ *ri.*	*North Declination.* ☉ *ſet.*	*Declination.* D	*Declination.* M	*South Declination.* ☉ *ri.*	*South Declination.* ☉ *ſet.*
Eaſt	Weſt	0.	0	Eaſt	Weſt
1		2.	47	1	
2		5.	35	2	
3		8.	18	3	
e *by* s	w *by* s	11.	8	e *by* n	w *by* n
1		13.	56	1	
2		16.	43	2	
3		19.	28	3	
e n e	w n w	22.	15	e s e	w s w

Latitude 9 Degrees.

North Declination. ☉ *ri.*	*North Declination.* ☉ *ſet.*	*Declination.* D	*Declination.* M	*South Declination.* ☉ *ri.*	*South Declination.* ☉ *ſet.*
Eaſt	Weſt	0.	0	Eaſt	Weſt
1		2.	47	1	
2		5.	34	2	
3		8.	17	3	
e *by* n	w *b* n	11.	6	e *by* s	w *by* s
1		13.	53	1	
2		16.	40	2	
3		19.	25	3	
e n e	w n w	22.	12	e s e	w s w

Latitude 10 degrees.

North Declination. ☉ *ri.*	*North Declination.* ☉ *ſet.*	*Declination.* D	*Declination.* M	*South Declination.* ☉ *ri.*	*South Declination.* ☉ *ſet.*
Eaſt	Weſt	0.	0	Eaſt	Weſt
1		2.	47	1	
2		5.	33	2	
3		8.	16	3	
e *by* n	w *by* n	11.	5	e *by* s	w *by* s
1		13.	51	1	
2		16.	37	2	
3		19.	21	3	
e n e	w n w	22.	7	e s e	w s w

Latitude 11 degres.

North Declination. ☉ *ri.*	*North Declination.* ☉ *ſet.*	*Declination.* D	*Declination.* M	*South Declination.* ☉ *ri.*	*South Declination.* ☉ *ſet.*
Eaſt	Weſt	0.	0	Eaſt	Weſt
1		2.	46	1	
2		5.	31	2	
3		8.	14	3	
e *by* n	w *by* n	11.	3	e *by* s	w *by* s
1		13.	48	1	
2		16.	33	2	
3		19.	18	3	
e n e	w n w	22.	3	e s e	w s w

Latitude 12 Degrees.				
North Declination.		*Declination*	*South Declination.*	
⊙ *ri.*	⊙ *ſet.*	D M	⊙ *ri.*	⊙ *ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.45	1	
2		5.30	2	
3		8.12	3	
e *by* n	w *by* n	11. 0	e *by* s	w *by* s
1		13.45	1	
2		16.30	2	
3		19.14	3	
e n e	w n w	21.58	e s e	w s w

Latitude 13 Degrees.				
North Declination.		*Declination*	*South Declination.*	
⊙ *ri.*	⊙ *ſet.*	D M	⊙ *ri.*	⊙ *ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.45	1	
2		5.29	2	
3		8.10	3	
e *by* n	w *b* n	11,57	e *by* s	w *by* s
1		13.42	1	
2		16.26	2	
3		19. 9	3	
e n e	w n w	21.53	e s e	w s w

Latitude 14 degrees.				
North Declination.		*Declination.*	*South Declination.*	
⊙ *ri.*	⊙ *ſet.*	D M	⊙ *ri.*	⊙ *ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.44	1	
2		5.28	2	
3		8. 8	3	
e *by* n	w *by* n	10.55	e *by* s	w *by* s
1		13.38	1	
2		16.22	2	
3		19. 4	3	
e n e	w nw	21.47	e s e	w s w

Latitude 15 degres.				
North Declination.		*Declination*	*South Declination.*	
⊙ *ri.*	⊙ *ſet.*	D M	⊙ *ri.*	⊙ *ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.43	1	
2		5.26	2	
3		8. 6	3	
e *by* n	w *by* n	10.52	e *by* s	w *by* s
1		13.35	1	
2		16.17	2	
3		18.59	3	
e n e	w n w	21.41	e s e	w s w

Latitude 16 Degrees.

North Declination.		*Declination.*	*South Declination.*	
☉ri.	☉ſet.	D M	☉ri.	☉ſet.
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.42	1	
2		5.25	2	
3		8. 3	3	
e *by* n	w *by* n	10.49	e *by* s	w *by* s
1		13.31	1	
2		16.12	2	
3		18.53	3	
e n e	w n w	21.34	e s e	w s w
1				

Latitude 17 Degrees.

North Declination.		*Declination.*	*South Declination.*	
☉ri.	☉ſet.	D M	☉ri.	☉ſet.
Eaſt	Weſt	0. 0	Eaſt	Weſt.
1		2.42	1	
2		5.23	2	
3		8. 1	3	
e *by* n	w *by* n	10.45	e *by* s	w *by* s
1		13.26	1	
2		16.08	2	
3		18.47	3	
e n e	w n w	21.27	e s e	w s w

Latitude 18 Degrees.

North Declination.		*Declination*	*South Declination.*	
☉ri.	☉ſet.	D M	☉ri.	☉ſet.
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.41	1	
2		5.25	2	
3		7.59	3	
e *by* n	w *by* n	10.42	e *by* s	w *by* s
1		13.22	1	
2		16. 2	2	
3		18.40	3	
e ne	w n w	21.20	e s e	w s w

Latitude 19 Degrees.

North Declination.		*Declination*	*South Declination.*	
☉ri.	☉ſet.	D M	☉ri.	☉ſet.
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.40	1	
2		5.20	2	
3		7.56	3	
e *by* n	w *by* n	10.38	e *by* s	w *by* s
1		13.17	1	
2		15.56	2	
3		18.33	3	
e n e	w n w	21.13	e s e	w s w

Latitude 20 Degrees.		
North Declination.	*Declination.*	*South Declination.*
☉*ri.* ☉*ſet.*	D M	☉*ri.* ☉*ſet.*
Eaſt Weſt	0. 0	Eaſt Weſt
1	2.39	1
2	5.17	2
3	7.52	3
e *by* n w *by* n	10.34	e *by* s w *by* s
1	13.12	1
2	15.51	2
3	18.27	3
e n e w n w	21. 5	e s e w s w

Latitude 21 Degrees.		
North Declination.	*Declination.*	*South Declination.*
☉*ri.* ☉*ſet.*	D M	☉*ri.* ☉*ſet.*
Eaſt Weſt	0. 0	Eaſt Weſt
1	2.38	1
2	5.15	2
3	7.50	3
e *by* n w *by* n	10.30	e *by* s w *by* s
1	13. 7	1
2	15.44	2
3	18.19	3
e n e w n w	20.55	e s e w s w
1	23.32	1

Latitude 22 Degrees.		
North Declination.	*Declination*	*South Declination.*
☉*ri.* ☉*ſet.*	D M	☉*ri.* ☉*ſet.*
Eaſt Weſt	0. 0	Eaſt Weſt
1	2.37	1
2	5.13	2
3	7.47	3
e *by* n w *by* n	10.25	e *by* s w *by* s
1	13. 1	1
2	15.38	2
3	18.11	3
e n e w n w	20.46	e s e w s w
1	23.22	1

Latitude 23 Degrees.		
North Declination.	*Declination*	*South Declination.*
☉*ri.* ☉*ſet.*	D M	☉*ri.* ☉*ſet.*
Eaſt Weſt	0. 0	Eaſt Weſt
1	2.36	1
2	5.11	2
3	7.43	3
e *by* n w *by* n	10.21	e *by* s w *by* s
1	12.50	1
2	15.31	2
3	18. 3	3
e n e w n w	20.37	e s e w s w
1	23.11	1

Latitude 24 Degrees.

North Declination.		*Declination*	*South Declination.*	
☉ *ri.*	☉ *ſet*	D M	☉ *ri.*	☉ *ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.35	1	
2		5. 9	2	
3		7.39	3	
e *by* n	w *by* n	10.16	e *by* s	w *by* s
1		12.50	1	
2		15.23	2	
3		17.54	3	
e n e	w n w	20.28	e s e	w s w
1		23. 0	1	

Latiitude 25 Degrees.

North Declination.		*Declination*	*South Declination.*	
☉ *ri.*	☉ *ſet.*	D M	☉ *ri.*	☉ *ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.33	1	
2		5. 6	2	
3		7.36	3	
e *by* n	w *by* n	10.11	e *by* s	w *by* s
1		12.43	1	
2		15.16	2	
3		17.46	3	
e n e	w n w	20.18	e s e	w s w
1		22.48	1	

Latitude 26 Degrees.

North Declination.		*Declination*	*South Declination.*	
☉ *ri.*	☉ *ſet.*	D M	☉ *ri.*	☉ *ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.32	1	
2		5. 4	2	
3		7.32	3	
e *by* n	w *by* n	10. 6	e *by* s	w *by* s
1		12.35	1	
2		15. 8	2	
3		17.37	3	
e n e	w n w	20. 7	e s e	w s w
1		22.36	1	

Latitude 27 Degrees.

North Declination.		*Declination*	*South Declination.*	
☉ *ri*	☉ *ſet.*	D M	☉ *ri.*	☉ *ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.31	1	
2		5. 1	2	
3		7.28	3	
e *by* n	w *by* n	10. 1	e *by* s	w *by* s
1		12.30	1	
2		15. 0	2	
3		17.28	3	
e n e	w n w	19.56	e s e	w s w
1		22.23	1	

Latitude 28 Degrees.

North Declination.		*Declination*	*South Declination.*	
☉ *ri.*	☉ *ſet*	D M	☉ *ri.*	☉ *ſet.*
East	Weſt	0. 0	East	Weſt
1		2.29	1	
2		4.58	2	
3		7.24	3	
e *by* n	w *by* n	9.55	e *by* s	w *by* s
1		12.24	1	
2		14.51	2	
3		17.17	3	
e n e	w n w	19.45	e s e	w s w
1		22.11	1	

Latitude 29 Degrees.

North Declination.		*Declination*	*South Declination.*	
☉ *ri.*	☉ *ſet.*	D M	☉ *ri.*	☉ *ſet.*
East	Weſt	0. 0	East	Weſt
1		2.28	1	
2		4.55	2	
3		7.20	3	
e *by* n	w *by* n	9.50	e *by* s	w *by* s
1		12.17	1	
2		14.43	2	
3		17. 7	3	
e n e	w n w	19.33	e s e	w s w
1		21.58	1	

Latitude 30 Degrees.

North Declination.		*Declination*	*South Declination.*	
☉ *ri.*	☉ *ſet.*	D M	☉ *ri.*	☉ *ſet.*
East	Weſt	0. 0	East	Weſt
1		2.27	1	
2		4.52	2	
3		7.18	3	
e *by* n	w *by* n	9.44	e *by* s	w *by* s
1		12. 9	1	
2		14.34	2	
3		15.57	3	
e n e	w n w	19.21	e s e	w s w
1		21.44	1	

Latitude 31 Degrees.

North Declination.		*Declination*	*South Declination.*	
☉ *ri*	☉ *ſet.*	D M	☉ *ri.*	☉ *ſet*
East	Weſt	0. 0	East	Weſt
1		2.25	1	
2		4.50	2	
3		7.13	3	
e *by* n	w. *by* n	9.38	e *by* s	w *by* s
1		12. 1	1	
2		14.39	2	
3		16.47	3	
e n e	w n w	19. 9	e s e	w s w
1		21.30	1	

Latitude 32 Degrees.				
North Declination.		*Declination*	*South Declination.*	
☉ *ri.*	☉ *ſet.*	D M	☉ *ri.*	☉ *ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.23	1	
2		4.46	2	
3		7. 8	3	
e *by* n	w *by* n	9.31	e *by* s	w *by* s
1		11.54	1	
2		14.16	2	
3		16.36	3	
e n e	w n w	18.55	e s e	w s w
1		21.16	1	

Latitude 33 Degrees.				
North Declination		*Declination*	*South Declination*	
☉ *ri.*	☉ *ſet.*	D.M.	☉ *ri.*	☉ *ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.22	1	
2		4.43	2	
3		7. 4	3	
e *by* n	w *by* n	9.25	e *by* s	w *by* s
1		11.46	1	
2		14.06	2	
3		16.24	3	
e n e	w n w	18.43	e s e	w s w
1		21. 1	1	
2		23.18	2	
			3	

Latitude 34 Degrees.				
North Declination.		*Declination*	*South Declination*	
☉ *ri.*	☉ *ſet.*	D M	☉ *ri.*	☉ *ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.20	1	
2		4.40	2	
3		6.59	3	
e *by* n	w *by* n	9.18	e *by* s	w *by* s
1		11.38	1	
2		13.56	2	
3		16.12	3	
e n e	w n w	18.30	e s e	w s w
1		20.46	1	
2		23. 1	2	

Latitude 35 Degrees.				
North Declination.		*Declination*	*South Declination*	
☉ *ri.*	☉ *ſet.*	D M	☉ *ri.*	☉ *ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.18	1	
2		4.37	2	
3		6.54	3	
e *by* n	w *by* n	9.12	s	w *by* s
1		11.2	1	
2		13. 1	2	
3		16. 2	3	
e n e	w n w	18.16	e s e	w s w
1		20.30	1	
2		22.43	2	

Latitude 36 Degrees.				
North Declination.		Declination	South Declination.	
☉ ri.	☉ ſet.	D M	☉ ri.	☉ ſet.
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.16	1	
2		4.33	2	
3		6.49	3	
e *by* n	w *by* n	09.05	e *by* s	w *by* s
1		11.21	1	
2		13.35	2	
3		15.49	3	
ene	wnw	18. 2	ese	wsw
1		20.15	1	
2		22.25	2	

Latitude 37 Degrees.				
North Declination		Declination	South Declination	
☉ ri.	☉ ſet.	D.M.	☉ ri.	☉ ſet.
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.15	1	
2		4.30	2	
3		6.43	3	
e *by* n	w *by* n	8.58	e *by* s	w *by* s
1		11.12	1	
2		13.25	2	
3		15.36	3	
ene	wnw	17.48	ese	wsw
1		19.58	1	
2		22. 7	2	

Latitude 38 Degrees.				
North Declination.		Declination	Sout Declination	
☉ ri.	☉ ſet.	DM	☉ ri.	☉ ſet.
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.13	1	
2		4.26	2	
3		6.38	3	
e *by* n	w *by* n	8.50	e *by* s	w *by* s
1		11. 3	1	
2		13.14	2	
3		15.23	3	
ene	wnw	17.33	ese	wsw
1		19.41	1	
2		21.49	2	

Latitude 39 Degrees.				
North Declination.		Declination	South Declination	
☉ ri.	☉ ſet.	D M	☉ ri.	☉ ſet.
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2.11	1	
2		4.22	2	
3		6.32	3	
e *by* n	w *by* n	8.43	e *by* s	w *by* s
1		10.53	1	
2		13. 3	2	
3		15.10	3	
ene	wnw	17.18	ese	wsw
1		19.25	1	
2		21.30	2	
3		23.32	3	

Latitude 40 Degrees.

North Declination.		*Declination*	*South Declination.*	
☉*ri.*	☉*ſet.*	D M	☉*ri.*	☉*ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2. 9	1	
2		4.19	2	
3		6.27	3	
e *by* n	w *by* n	8.36	e *by* s	w *by* s
1		10.43	1	
2		12.51	2	
3		14.57	3	
ene	wnw	17. 3	ese	wsw
1		19. 7	1	
2		21.10	2	
3		23.11	3	

Latitude 41 degrees.

North Declination.		*Declination*	*South Declination.*	
☉*ri.*	☉*ſet.*	D M	☉*ri.*	☉*ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2. 7	1	
2		4.15	2	
3		6.22	3	
e *by* n	w *by* n	8.28	e *by* s	w *by* s
1		10.34	1	
2		12.40	2	
3		14.44	3	
ene	wnw	16.47	ese	wsw
1		18.50	1	
2		20.51	2	
3		22.50	3	

Latitude 42 degrees.

North Declination.		*Declination*	*South Declination.*	
☉*ri.*	☉*ſet.*	D M	☉*ri.*	☉*ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2. 6	1	
2		4.11	2	
3		6.16	3	
e *by* n	w *by* n	8.20	e *by* s	w *by* s
1		10.24	1	
2		12.28	2	
3		14.30	3	
ene	wnw	16.31	ese	wsw
1		18.32	1	
2		20.31	2	
3		22.27	3	

Latitude 43 degrees.

North Declination.		*Declination*	*South Declination.*	
☉*ri.*	☉*ſet.*	D M	☉*ri.*	☉*ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2. 4	1	
2		4. 7	2	
3		6.10	3	
e *by* n	w *by* n	8.12	e *by* s	w *by* s
1		10.14	1	
2		12.16	2	
3		14.16	3	
ene	wnw	16.15	ese	wsw
1		18.14	1	
2		20.10	2	
3		22. 5	3	

Latitude 44 Degrees.				
North Declination		*Declination*	*South Declination.*	
☉*ri.*	☉*ſet.*	D M	☉*ri.*	☉*ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2. 1	1	
2		4. 3	2	
3		6. 4	3	
e *by* n	w *by* n	8. 4	e *by* s	w *by* s
1		10. 4	1	
2		12. 3	2	
3		14. 1	3	
e n e	w n w	15.59	e s e	w s w
1		17.54	1	
2		19.50	2	
3		21.42	3	
n e*b* e	nw*b*w	23.32	se*by*e	s w*b*w

Latitude 45 degrees.				
North Declination.		*Declination*	*South Declination.*	
☉*ri.*	☉*ſet.*	D M	☉*ri.*	☉*ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		2. 0	1	
2		3.59	2	
3		5.57	3	
e *by* n	w *by* n	7.56	e *by* s	w *by* s
1		9.54	1	
2		11.51	2	
3		13.46	3	
e n e	w n w	15.42	e s e	w s w
1		17.36	1	
2		19.30	2	
3		21.19	3	
n e*b*e	nw*b*w	23. 8	se *b* e	sw*b*w

Latitude 46 degrees.				
North Declination.		*Declination*	*South Declination.*	
☉*ri.*	☉*ſet.*	D M	☉*ri.*	☉*ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		1.58	1	
2		3.55	2	
		5.51	3	
e *by* n	w *by* n	7.47	e *by* s	w *by* s
1		9.43	1	
2		11.38	2	
3		13.32	3	
e n e	w n w	15.25	e s e	w s w
1		17.17	1	
2		19. 7	2	
3		20.55	3	
ne*b* e	nw*b*w	22.42	se *b* e	sw*b*w

Latitude 47 degrees.				
North Declination.		*Declination*	*South Declination.*	
☉*ri.*	☉*ſet.*	D M	☉*ri.*	☉*ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		1.55	1	
2		3.50	2	
3		5.45	3	
e *by* n	w *by* n	7.39	e *by* s	w *by* s
1		9.33	1	
2		11.25	2	
3		13.17	3	
e n e	w n w	15. 8	e s e	w s w
1		16.57	1	
2		18.46	2	
3		20.31	3	
ne*b* e	nw*b*w	22.16	se *b* e	sw*b*w

Latitude 48 Degrees.

North Declination.		*Declination*	*South Declination.*	
☉ *ri.*	☉ *ſet.*	D M	☉ *ri.*	☉ *ſet*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		1.53	1	
2		3.46	2	
3		5.38	3	
e *by* n	w *by* n	7.30	e *by* s	w *by* s
1		9.22	1	
2		11.12	2	
3		13. 1	3	
e n e	w n w	14.50	e s e	w s w
1		16.38	1	
2		18.24	2	
3		20. 7	3	
n e *b* e	n w *b* w	21.49	se *b* e	s w *b* w
1		23.29	1	

Latitude 49 Degrees.

North Declination.		*Declination.*	*South Declination.*	
☉ *ri.*	☉ *ſet.*	D M	☉ *ri.*	☉ *ſet.*
Eaſt	Weſt	0. 0	Eaſt	Weſt
1		1.51	1	
2		3.42	2	
3		5.31	3	
e *by* n	w *by* n	7.22	e *by* s	w *by* s
1		9.10	1	
2		10.59	2	
3		12.46	3	
e n e	w n w	14.28	e s e	w s w
1		16.17	1	
2		18. 1	2	
3		19.42	3	
n e *b* e	n w *b* w	21.22	se *by* e	s w *b* w
1		23. 1	1	

Latitude 50 degrees.

Eaſt	Weſt	0. 0	Eaſt	Weſt
1		1.48	1	
2		3.37	2	
3		5.25	3	
e *by* n	w *by* n	7.12	e *by* s	w *by* s
1		8.55	1	
2		10.46	2	
3		12. 3	3	
e ne	w n w	14.14	e s e	w s w
1		15.57	1	
2		17.39	2	
3		19.18	3	
ne *b* e	n w *b* w	20.55	se *by* e	s w *b* w
1		22.31	1	

Latitude 51 degrees.

Eaſt	Weſt	0. 0	Eaſt	Weſt
1		1.46	1	
2		3.33	2	
3		5.18	3	
e *by* n	w *by* n	7. 4	e *by* s	w *by* s
1		8.48	1	
2		10.32	2	
3		12.14	3	
e ne	w n w	13.56	e s e	w s w
1		15.36	1	
2		17.16	2	
3		18.52	3	
ne *b* e	n w *b* w	20.28	s e *by* e	s w *b* w
1		22. 1	1	
2		23. 32	2	

Latitude 52 degrees.

North Declination.		Declination	South Declination.	
☉ ri.	☉ ſet.	D M	☉ ri.	☉ ſet.
East	West	0. 0	East	West
1		1.44	1	
2		3.28	2	
3		5.11	3	
e *by* n	w *by* n	6.54	e *by* s	w *by* s
1		8.37	1	
2		10.18	2	
3		11.58	3	
e n e	w n w	13.37	e s e	w s w
1		15.16	1	
2		16.52	2	
3		18.27	3	
ne *b* e	nw *b* w	20. 0	se *b* e	s w *b* w
1		21.31	1	
2		23. 0	2	

Latitude 53 Degrees.

North Declination.		Declination.	South Declination.	
☉ ri.	☉ ſet.	D M	☉ ri.	☉ ſet.
East	West	0. 0	East	Wes
1		1.42	1	
2		3.23	2	
3		5. 4	3	
e *by* n	w *by* n	6.44	e *by* s	w *by* s
1		8.25	1	
2		10. 4	2	
3		11.41	3	
e n e	w n w	13.19	e s e	w s w
1		14.55	1	
2		16.29	2	
3		18. 1	3	
ne *b*e	n w *bw*	19.32	se *bye*	sw*bw*
1		21. 1	1	
2		22.27	2	

Latitude 54 degrees.

East	West	0. 0	East	West
1		1.39	1	
2		3.18	2	
3		4.57	3	
e *by* n	w *by* n	6.35	e *by* s	w *by* s
1		8.13	1	
2		9.50	2	
3		11.25	3	
e ne	w n w	13. 0	e s e	w s w
1		14.33	1	
2		16. 5	2	
3		17.39	3	
ne *b* e	nw*bw*	19. 3	s e*bye*	sw *b* w
1		20.30	1	
2		21.54	2	
3		23.15	3	

Latitude 55 degrees.

East	West	0. 0	East	Wes
1		1.37	1	
2		3.14	2	
3		4.49	3	
e *by* n	w *by* n	6.25	e *by* s	w *by*
1		8. 1	1	
2		9.35	2	
3		11. 8	3	
e ne	w n w	12.41	e s e	w s w
1		14.12	1	
2		15.42	2	
3		17. 9	3	
ne*be*	nw *bw*	18.35	s e*bye*	sw *bw*
1		19.59	1	
2		21.21	2	
3		22.39	3	

Latitude 56 Degrees.

North Declination.		*Declination*	*South Declination.*	
☉*ri.*	☉ *ſet.*	D M	☉*ri.*	☉ *ſet.*
Eaſt	Weſt	00.00	Eaſt	Weſt
	1	01.34	1	
	2	03.09	2	
	3	04.42	3	
e *by* n	w *by* n	06.16	e *by* s	w *by* s
	1	07.49	1	
	2	09.21	2	
	3	10.51	3	
e n e	w n w	12.22	e s e	w s w
	1	13.50	1	
	2	15.18	2	
	3	16.42	3	
ne*be*	nw *bw*	18.06	s e *be*	sw *bw*
	1	19.28	1	
	2	20.47	2	
	3	22.03	3	
n e	n w	23.18	s e	s w

Latitude 57 Degrees.

North Declination.		*Declination*	*South Declination.*	
☉*ri.*	☉ *ſet.*	D M	☉*ri.*	☉ *ſet.*
Eaſt	Weſt	00.00	Eaſt	Weſt
	1	01.32		1
	2	03.04		2
	3	04.35		3
e *by* n	w *by*n	06.06	e *by* s	w *by* s
	1	07.36		1
	2	09.06		2
	3	10.34		3
e n e	w n w	12.01	e s e	w s w
	1	13.28		1
	2	14.53		2
	3	16.16		3
ne *be*	nw *bw*	17.37	se*b* e	sw*b* w
	1	18.56		1
	2	20.13		2
	3	21.27		3
n e	n w	22.39	se	s w

Latitude 58 Degrees.

Eaſt	Weſt	00.00	Eaſt	Weſt
	1	01.30	1	
	2	02.59	2	
	3	04.28	3	
e *by* n	w *by*n	05.56	e *by* s	w *by* s
	1	07.24	1	
	2	08.51	2	
	3	10.17	3	
e n e	w n w	11.42	e s e	w s w
	1	13.06	1	
	2	14.28	2	
	3	15.48	3	
ne*be*	nw *bw*	17.07	se*b* e	sw *bw*
	1	18.24	1	
	2	19.38	2	
	3	20.50	3	
n e	n w	22.00	s e	s w
	1	23.08	1	

Latitude 59 Degrees.

Eaſt	Weſt	00.00	Eaſt	Weſt
	1	01.27		1
	2	02.54		2
	3	04.20		3
e *by* n	w *by*n	05.46	e *by* s	w *by*s
	1	07.11		1
	2	08.36		2
	3	10.00		3
e n e	w n w	11.22	e s e	w s w
	1	12.42		1
	2	14.03		2
	3	15.21		3
n e*be*	nw *bw*	16.37	s e *be*	sw *bw*
	1	17.52		1
	2	19.04		2
	3	20.14		3
ne	nw	21.22	s e	s w
	1	22.26		1
	2	23.27		2

Latitude 60 Degrees.

North Declination.			*South Declination.*		
☉*ri.*	D M	☉ *ſet.*	☉*ri.*	D M	☉*ſet.*
Eaſt	00.00	Weſt	Eaſt	00.00	Weſt
1	01.25	1	1	01.25	1
2	02.49	2	2	02.49	2
3	04.12	3	3	04.12	3
e *by* n	05.36	w *by* n	e *by* s	05.36	w *by* s
1	06.59	1	1	06.59	1
2	08.21	2	2	08.21	2
3	09.42	3	3	09.42	3
e n e	11.02	w n w	e s e	11.02	w s w
1	12.21	1	1	12.21	1
2	13.38	2	2	13.38	2
3	14.53	3	3	14.53	3
n e *by* e	16.18	n w *by* w	s e *by* e	16.18	s w *by* w
1	17.20	1	1	17.20	1
2	18.30	2	2	18.30	2
3	19.38	3	3	19.38	3
n e	20.42	n w	s e	20.42	s w
1	21.45	1	1	21.45	1
2	22.44	2	2	22.44	2

The Deſcription and Uſe of the foregoing TABLES.

1. THeſe Tables of Points of the Compaſs, at which the *Sun*, or any *Star*, whoſe Declination exceeds not 23 d. 30 m. begin at Latitude 0 Degree and proceeding orderly to 60 Degrees, (being ſome 4, ſome 2 Tables in one Page) are 61 in all.

2. In each Table are 5 Columns, the middlemoſt contains the Degrees of Declination, either North or South; thoſe 2 on the left hand of it is *Sun-Riſing* and *Sun Setting*, under *North Declination*; and on the right hand is the like, under *South Declination*.

3. The 1*ſt* and 2*d* Columns (under *North Declination*) as alſo the 4*th* and 5*th* (under *South Declimation*) contain the Points, and each quarter of a Point of the Compaſs, of both *Riſing* and *Setting*; Thus *Eaſt* | *Weſt*, under which is 1, 2, 3; that is *Eaſt*, or *Weſt* 1 *quarter*, 2 *quartets*, 3 *quarters Northerly*, *Southerly*, then E. by N. W. by N. under which is 1, 2, 3; that is E. by N. or W. and by N. 1 *quarter*, 2 *quarters Northerly*, &c.

Theſe Tables are ready Helps to find the Variation of the Compaſs with eaſe and ſufficient exactneſs; evidently made out in the following Uſes.

To find the Point of the Compaſs that the Sun riſeth or ſets at in any time of the Year.

FIrſt ſeek the *Sun's Declination* in the Table of Declination for the Time propoſed; with which enter the foregoing Table, finding the *Latitude* in the head of the Table, and the *Declination* in the 3d Column; againſt which, on the Left-hand, if it be *North Declination*, but on the Right-hand, if it be *South Declination*, is the *Point of the Compaſs that the Sun riſes or ſets at*, according to the Titles at the head of the Table.

Note, Theſe Tables ſhew the true Points of the Sun's Riſing or Setting; ſo that you may readily know at any time, ſeeing the Sun riſe or ſet, the Variation by an ordinary *Meridian Compaſs*.

There are ſome Compaſſes not touched ſo well as they ought to be: others in time, the Virtue of the Stone wears off from the Needle.

Now by theſe foregoing Tables, you may very readily diſcover any of theſe Defects.

But it may be objected, they cannot ſet the Sun by an ordinary *Meridian Compaſs*, ſo near as is required.

To this I anſwer; It is as eaſy to ſet the Sun by the Compaſs, as ſteer a Ship by it: For expert Sea-men can ſet the Sun, or a *Headland*, to near a quarter of a Point, by their Hand (but with Sights much nearer the Truth.) The Poſture to obſerve in ſuch a Caſe, I adviſe, is thus;

Set the Compaſs about two Foot high; and directing your Hand towards the Sun, note what *Point*, *half Point*, or *quarter Point*, the Sun riſeth or ſetteth on; then, in that Table belonging to the Latitude, ſee whether the Sun riſeth or ſets that Day upon the ſame Point, found by Obſervation: If they agree there is no Variation; but if they do not agree, the Compaſs is not true, or there is Variation; and the Variation is ſo much as is the Difference between the Obſervation and the Table.

Example 1. *Admit in Latitude* 30 *d. the Sun having* 9 *d.* 44 *m. North Declination; I obſerve the Sun that Day to riſe upon the E. N. E. Point of the Compaſs; I demand the Variation?*

In the head of the Foregoing Tables, look for the *Latitude* 30 *Degrees*, and in the third Column for 9d. 44m. North Declination; againſt it (under Sun riſe) is E. by N. which ſheweth that there is one Point Variation. For it appears by the Table, that the E. N. E. Point on the Compaſs, is the true E. by N. Point; and the E. by N. (as it is upon the Compaſs) is the true *Eaſt-Point*; the *Eaſt-Point* is the true E. by S. the S. E. is the S. E. by S. and the *South* is the S. by W. the *Weſt* is the W. by N. and the *North* is the N. by E.

This plainly appears by the *Rectifier*, if you bring the E. by N. on the outward Circle, to touch the E.N.E. on the inward Circle.

Now, ſuppoſe we were to obſerve the Sun at his ſetting, in the Latitude of 30 deg. with Declination 9 deg. 44 min. *North*, as aboveſaid, we ſhould find the Sun to ſet exactly *Weſt* by the Compaſs, although in the Morning we did find the Sun to riſe at E. N. E. I know this will be little leſs than a Contradiction to ſome; but if you caſt your Eye upon the *Rectifier*, you may ſee it is a certain Truth.

Example 2. In Latitude 37 d. the Sun's Declination 8 d. 58 m. North I obſerve the Sun to riſe E. by N. by the Compaſs; I demand the Variation?

In the Table that belongs to 37 d. againſt 8d. 58 m. N. Declination(and under the Sun-riſe)is E. by N; which ſheweth ,(ſeeing the Obſervatton doth agree with the Table) there is no Variatton.

Note, if the Declination for the Day propoſed be not the ſame with the Declination in the Tables, then have regard to the neareſt, allowing for the Difference.

Example 3. In Latitude 37d. 0m. ſuppoſe the Declination 10 d. 15 m. N. I demand the Point of the Compaſs that the Sun ſhould riſe with?

In the Table the neareſt to 10 d. 15 m. is 11 d. 12 m. againſt which the Sun riſeth E. by N. ¼ N. and ſets W. by N. ¼ N. but becauſe the Declination propoſed, is near about the middle between 8 d. 48 m. and 11 d. 12 min. therefore the Sun riſeth E. by N. half a quarter N. and ſetteth W. by N. half a quarter N.

Underſtand the like in any other caſe, let the Declination be what it will, in any other Latitude.

Example 4. Admit in the Latitude 38d. 20m. and Declination 19 d. 50m. South. The Sun riſeth upon the *E.S.E.* Point of the Compaſs; I demand the Variation?

In the Table for Latitude38 d. and againſt 19 d. 41 m. (the neareſt to the given Declination) is E.S.E. a quarter S; which ſheweth, that there is a quarter of a Point Variation: For the E.S.E. Point is the E.S.E. ¼ S. and the North Point is N. ¼ E: For if you do bring E. S. E. ¼ S. on the outward Circle of the *Rectifier*, to touch E. S. E. on the inward Circle, then S. S. W. on the Compaſs, is S. S. W. ¼ W. and S. E. is S. E. ¼ S. and Eaſt is Eaſt ¼ S. and ſo for any other Point, half Point, or quarter Point; by caſting your Eye upon the Rectifier.

Note, The Tables ſhew the true *Points of riſing and ſetting*, and the outward Circle on the *Rectifier* doth the ſame: But the Compaſs, when it differeth from the Tables, ſheweth a falſe Point; and the inward Circle on the *Rectifier* doth the ſame.

Example 5. Admit in the Latitude 47 d. 24. m. the Declination 15 d. 2 m. *South*, the Sun Riſing is E. by S. by the Compaſs; I demand the Varition?

By the Tables the Sun ſhould riſe E. S. E. therefore there is one Point Variation: For if you bring the E.S.E. on the outward Circle of the *Rectifier*, to touch the E. by S. on the inward, then the N. by W. on the Compaſs, is the true *North* Point: the N. W. is the N. W. by N. and the S. by E. is the true *South* Point.

By this time, I ſuppoſe my Reader able to diſcover how much the *Variation* is, and how to reckon it, without any *Geometrical Demonſtration*. or *Arithmetical Calculation*.

Note, If you have any odd minutes of Latitude, go to that Table neareſt the Latitude you are in.

I come now to reſolve a Queſtion ſome are puzled with; and that is this.

Queſt. If the Sun riſe at E. N. E. in any *Latitude*, ſhould he not ſet the ſame Day at W. N. W. in the ſame *Latitude*?

Anſw. If there be no variation, it will; but if there be Variation, it will not be ſo: The reaſon is evident by the *Rectifier*.

By theſe Tables you may know the Point of the Compaſs, that any of the Stars do riſe and ſet within any Latitude (the Tables contain) either *North* or *South*; if their Declination do not exceed the Sun's greateſt Declination.

Example 6. Let it be required to find the Point of the Compaſs the *Bull's-Eye* riſes and ſets with, in the Latitude of 50 Degrees?

The Declination of this Star is 15 d. 47 m. *North*; in the Table that belongs to 50 d. againſt 15 d. 47 m. *North* Declination, the Point of riſing is E. N. E. ¼ N. and the Point of ſetting W. N. W. ¼ N.

Underſtand the like for any other Star, whoſe Declination exceeds not the Sun's greateſt Declination.

The Uſe of the RECTIFIER.

THIS Inſtrument, as before Deſcribed in Page 91, and 92, containeth two Circles or Compaſſes one within the other; but as it is made in Wood, the one moveth upon the other; and by it the Compaſs when it doth vary, may be rectified as followeth.

Bring the true Point of Riſing or Setting (as the Table ſheweth) on the outward or under Compaſs, to touch the falſe Point of Riſing or Setting (as your Compaſs ſheweth) on the inward or upper Compaſs; then will the under Compaſs rectify the upper.

Example 7. Admit in Latitude 45 degrees the Sun's Declination being 7 deg. 56 min. *South*, the Sun ſetting upon the W. by N. Point of the Compaſs; I demand the Variation.

The Sun (if there be no Variation) will ſet at W. by S. and riſe at E. by S. as the Table ſheweth: therefore it appears there is two Points Variation.

Bring the W. by S. Point on the outward Compaſs to touch the W. by N. Point on the inward Compaſs: Then the Points upon the outward Compaſs, do explain the Points that are upon the inward, ſo that according to the foregoing Obſervation, the N. N. E. Point on the Compaſs, is the true *North*; the *North* is the true N. N. W; the W. by N. is the true W. by S. the S. E. by E. is the true E. by S. and ſo for any other Point of the Compaſs, by only looking on the *Rectifier*.

And thus you may rectify the Compaſs, without reckoning which way the Variation is, either Eaſtward or Weſtward; the *Rectifier* doth that ſo plain, that you cannot be miſtaken.

This *Rectifier* is made in Wood, [illegible] *James Atkinſon* at *Cherry-Garden-Stairs*, on *Rotherith* [illegible]; alſo all ſorts of Mathematical Books, and Inſtruments, are there Sold.

A TABLE *of Amplitudes, fitting all Places from the Equinoctial to* 60 *Degrees of Latitude, either North or South.*

The Degrees of Latitude.

Sun's Decl. Degrees of Declination.	1	2	3	4	5	6
	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.
0	00 00	00 00	00 00	00 00	00 00	00 00
1	01 00	01 00	01 00	01 00	01 00	01 00
2	02 00	02 00	02 00	02 00	02 00	02 00
3	03 00	03 00	03 00	03 00	03 00	03 01
4	04 00	04 00	04 00	04 00	04 01	04 01
5	05 00	05 00	05 00	05 00	05 01	05 01
6	06 00	06 00	06 00	06 01	06 01	06 02
7	07 00	07 00	07 00	07 01	07 01	07 02
8	08 00	08 00	08 01	08 01	08 02	08 02
9	09 00	09 00	09 01	09 01	09 02	09 02
10	10 00	10 00	10 01	10 01	10 02	10 03
11	11 00	11 00	11 01	11 01	11 02	11 03
12	12 00	12 00	12 01	12 01	12 03	12 04
13	13 00	13 00	13 01	13 01	13 03	13 04
14	14 00	14 00	14 01	14 02	14 03	14 04
15	15 00	15 00	15 01	15 02	15 03	15 05
16	16 00	16 00	16 01	16 02	16 04	16 05
17	17 00	17 00	17 01	17 02	17 04	17 05
18	18 00	18 00	48 01	18 02	18 04	18 06
19	19 00	19 00	19 01	19 02	19 04	19 06
20	20 00	20 00	20 02	20 03	20 05	20 06
21	21 00	21 00	21 02	21 03	21 05	21 07
22	22 00	[illegible]	22 02	22 03	22 05	22 07
23	23 00	[illegible]	23 02	23 03	23 05	13 08
23,31	23 31	23 32	23 33	23 35	23 37	23 39

A TABLE *of Amplitudes, fitting all Places from the Equinoctial to* 60 *Degrees of Latitude, either North or South.*

The Degrees of Latitude.

Sun's Decl.	7		8		9		10		11		12	
Degrees of Declination.	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.
0	00	00	00	00	00	00	00	00	00	00	00	00
1	01	00	01	00	01	00	01	01	01	01	01	01
2	02	01	02	01	02	01	02	02	02	02	02	03
3	03	01	03	01	03	01	03	03	03	03	03	04
4	04	02	04	02	04	02	04	04	04	04	04	05
5	05	02	05	02	05	03	05	05	05	05	05	07
6	06	02	06	03	06	04	06	06	06	06	06	08
7	07	03	07	04	07	05	07	07	07	08	07	09
8	08	03	08	04	08	06	08	08	08	09	08	11
9	09	04	09	05	09	06	09	09	09	10	09	12
10	10	04	10	06	10	07	10	10	10	11	10	13
11	11	05	11	06	11	08	11	11	11	13	11	15
12	12	05	12	07	12	09	12	12	12	14	12	16
13	13	06	13	08	13	09	13	13	13	15	13	17
14	14	06	14	08	14	10	14	14	14	16	14	19
15	15	07	15	09	15	11	15	15	15	17	15	20
16	16	07	16	10	16	12	16	16	16	19	16	22
17	17	08	17	10	17	13	17	17	17	20	17	23
18	18	08	18	11	18	14	18	18	18	21	18	25
19	19	09	19	12	19	15	19	19	19	22	19	26
20	20	09	20	12	20	16	20	20	20	24	20	28
21	21	10	21	13	21	17	21	21	21	25	21	29
22	22	10	22	13	22	18	22	22	22	27	22	31
23	23	11	23	14	23	19	23	23	23	28	23	33
23,31	23	42	23	46	23	50	23	54	23	59	24	05

A TABLE *of Amplitudes, fitting all Places from the Equinoctial to* 60 *Degrees of Latitude, either North or South.*

The Degrees of Latitude.

Sun's Decl. Degrees of Declination.	13		14		15		16		17		19	
	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.
0	00	00	00	00	00	00	00	00	00	00	00	00
1	01	02	01	02	01	02	01	02	01	02	01	03
2	02	03	02	04	02	04	02	05	02	03	02	06
3	03	05	03	05	03	06	03	07	03	08	03	09
4	04	06	04	07	04	08	04	10	04	11	04	12
5	05	08	05	09	05	10	05	12	05	13	05	15
6	06	10	06	11	06	13	06	15	06	17	06	19
7	07	11	07	13	07	15	07	17	07	19	07	22
8	08	13	08	15	08	17	08	19	08	22	08	25
9	09	14	09	17	09	19	09	22	09	25	09	28
10	10	16	10	19	10	21	10	24	10	28	10	31
11	11	17	11	20	11	23	11	27	11	30	11	34
12	12	19	12	22	12	25	12	29	12	33	12	38
13	13	20	13	24	13	27	13	32	13	36	13	41
14	14	22	14	26	14	30	14	34	14	39	14	44
15	15	24	15	28	15	32	15	37	15	42	15	47
16	16	26	16	30	16	35	16	40	16	45	16	51
17	17	28	17	32	17	37	17	42	17	48	17	54
18	18	30	18	34	18	39	18	45	18	51	18	58
19	19	31	19	36	19	42	19	48	19	54	20	01
20	20	33	20	38	20	44	20	51	20	57	21	04
21	21	35	21	40	21	46	21	53	22	00	22	08
22	22	37	22	43	22	49	22	56	23	04	23	12
23	23	39	23	45	23	51	23	58	24	06	24	15
23,31	24	11	24	17	24	24	24	32	24	40	24	49

A TABLE *of Amplitudes, ſitting all Places from the Equinoctial to* 60 *Degrees of Latitude, either North or South.*

The Degrees of Latitude.

Sun's Decl. Degrees of Declination.	19		20		21		22		23		2	
	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.
0	00	00	00	00	00	00	00	00	00	00	00	00
1	01	03	01	04	01	04	01	05	01	05	01	06
2	02	07	02	08	02	08	02	09	02	10	02	12
3	03	10	03	12	03	13	03	14	03	15	03	17
4	04	14	04	16	04	17	04	19	04	21	04	23
5	05	17	05	19	05	21	05	23	05	26	05	28
6	06	21	06	23	06	26	06	28	06	31	06	34
7	07	24	07	27	07	30	07	33	07	37	07	40
8	08	28	08	31	08	34	08	38	08	42	08	46
9	09	31	09	35	09	39	09	43	09	47	09	51
10	10	35	10	39	10	43	10	48	10	52	10	57
11	11	38	11	43	11	48	11	53	11	58	12	03
12	12	42	12	47	12	52	12	58	13	03	13	09
13	13	46	13	51	13	57	14	03	14	09	14	15
14	14	50	14	55	15	01	15	08	15	14	15	21
15	15	53	16	00	16	06	16	13	16	20	16	27
16	16	57	17	04	17	11	17	18	17	26	17	34
17	18	01	18	08	18	15	18	23	18	31	18	40
18	19	05	19	12	19	20	19	28	19	37	19	46
19	20	08	20	16	20	24	20	33	20	42	20	52
20	21	12	21	20	21	29	21	39	21	49	21	59
21	22	16	22	25	22	34	22	44	22	55	23	07
22	23	20	23	29	23	39	23	50	24	01	24	12
23	24	24	24	34	24	44	24	55	25	07	25	19
23,31	24	58	25	08	25	18	25	29	25	41	25	54

A TABLE *of Amplitudes, fitting all Places from the Equinoctial to* 60 *Degrees of Latitude, either North or South.*

Sun's Decl. Degrees of Declination.	The Degrees of Latitude. 25	26	27	28	29	30
	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.
0	00 00	00 00	00 00	00 00	00 00	00 00
1	01 06	01 07	01 08	01 08	01 09	01 09
2	02 12	02 13	02 15	02 16	02 17	02 18
3	03 18	03 20	03 22	03 24	03 26	03 28
4	04 25	04 27	04 29	04 32	04 34	04 37
5	05 31	05 34	05 37	05 40	05 43	05 46
6	06 37	06 41	06 44	06 48	06 52	06 56
7	07 43	07 47	07 51	07 56	08 01	08 06
8	08 50	08 54	08 59	09 04	09 09	09 15
9	09 56	10 01	10 06	10 12	10 18	10 24
10	11 03	11 08	11 14	11 21	11 27	11 34
11	12 09	12 15	12 21	12 28	12 36	12 44
12	13 16	13 28	13 30	13 37	13 45	13 53
13	14 22	14 30	14 37	14 45	14 54	15 03
14	15 29	15 37	15 45	15 54	16 03	16 12
15	16 35	16 44	16 53	17 03	17 12	17 23
16	17 42	17 51	18 01	18 11	18 21	18 32
17	18 49	18 59	19 09	19 20	19 31	19 43
18	19 56	20 06	20 17	20 29	20 41	20 54
19	21 02	21 13	21 25	21 38	21 51	22 05
20	22 10	22 22	22 34	22 48	23 02	23 16
21	23 18	23 30	23 43	23 57	24 12	24 27
22	24 24	24 37	24 51	25 06	25 22	25 38
23	25 32	25 46	25 01	26 16	26 32	26 49
23,31	26 08	26 23	26 29	26 46	27 03	27 21

A TABLE *of Amplitudes, fitting all Places from the Equinoctial to* 60 *Degrees of Latitude, either North or South.*

The Degrees of Latitude.

Sun's Decl. Degrees of Declination.	31		32		33		34		35		36	
	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.
0	00	00	00	00	00	00	00	00	00	00	00	00
1	01	10	01	10	01	11	01	12	01	13	01	14
2	02	19	02	21	02	23	02	25	02	27	02	29
3	03	30	03	33	03	35	03	38	03	40	03	43
4	04	40	04	43	04	46	04	50	04	53	04	57
5	05	50	05	54	05	58	06	02	06	06	06	11
6	07	00	07	05	07	10	07	15	07	20	07	25
7	08	11	08	16	08	21	08	27	08	33	08	40
8	09	21	09	27	09	33	09	39	09	46	09	54
9	10	31	10	38	10	45	10	52	11	00	11	08
10	11	41	11	48	11	55	12	03	12	12	12	21
11	12	52	13	00	13	09	13	18	13	28	13	39
12	14	02	14	11	14	21	14	32	14	43	14	54
13	15	13	15	23	15	33	15	44	15	56	16	09
14	16	22	16	33	16	45	16	57	17	10	17	24
15	17	34	17	46	17	58	18	11	18	25	18	40
16	18	44	18	57	19	11	19	25	19	40	19	55
17	19	56	20	10	20	24	20	39	20	55	21	11
18	21	07	21	21	21	36	21	53	22	10	22	27
19	22	19	22	34	22	50	23	07	23	25	23	44
20	23	31	23	47	24	04	24	22	24	41	25	00
21	24	43	25	00	25	18	25	37	25	56	26	17
22	25	55	26	13	26	32	26	52	27	13	27	35
23	27	07	27	26	27	46	28	07	28	29	28	52
23,31	27	40	28	00	28	21	28	43	29	07	29	31

A TABLE *of Amplitudes, fitting all Places from the Equinoctial to* 60 *Degrees of Latitude, either North or South.*

The Degrees of Latitude.

Sun's Decl. Degrees of Declination.	37		38		39		40		41		42	
	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.
0	00	00	00	00	00	00	00	00	00	00	00	00
1	01	15	01	16	01	17	01	18	01	20	01	21
2	02	30	02	32	02	34	02	36	02	39	02	41
3	03	45	03	48	03	51	03	54	03	58	04	02
4	05	00	05	04	05	08	05	13	05	18	05	23
5	06	16	06	21	06	26	06	32	06	38	06	44
6	07	31	07	37	07	43	07	50	07	57	08	05
7	08	47	08	54	09	01	09	09	09	17	09	26
8	10	02	10	10	10	19	10	28	10	37	10	47
9	11	17	11	27	11	37	11	47	11	58	12	09
10	12	32	12	43	12	54	13	05	13	18	13	31
11	13	50	14	01	14	13	14	26	14	39	14	53
12	15	06	15	18	15	31	15	45	16	00	16	15
13	16	22	16	35	16	49	17	04	17	20	17	37
14	17	38	17	52	18	08	18	24	18	42	19	00
15	18	55	19	11	19	28	19	45	20	04	20	23
16	20	11	20	28	20	46	21	05	21	25	21	46
17	21	28	21	46	22	06	22	26	22	48	23	10
18	22	46	23	05	23	25	23	47	24	10	24	34
19	24	04	24	24	24	46	25	09	25	33	25	58
20	25	21	25	43	26	06	26	30	26	56	27	24
21	26	39	27	02	27	27	27	53	28	21	28	50
22	27	58	28	23	28	49	29	16	29	45	30	16
23	29	17	29	43	30	11	30	40	31	11	31	43
23,31	29	57	30	24	30	52	31	22	31	54	32	28

A TABLE *of Amplitudes, fitting all Places from the Equinoctial to* 60 *Degrees of Latitude, either North or South.*

The Degrees of Latitude.

Sun's Decl. Degrees of Declination.	43	44	45	46	47	48
	D. M.	D. M.	D- M.	D. M.	D. M.	D. M.
0	00 00	00 00	00 00	00 00	00 00	00 00
1	01 22	01 23	01 25	01 26	01 28	01 29
2	02 44	02 47	02 50	02 53	02 56	02 59
3	04 06	04 10	04 15	04 19	04 24	04 29
4	05 28	05 34	05 40	05 46	05 52	05 59
5	06 51	06 58	07 05	07 12	07 20	07 29
6	08 13	08 21	08 30	08 39	08 49	08 59
7	09 35	09 45	09 56	10 06	10 18	10 30
8	10 58	11 09	11 21	11 34	11 47	12 00
9	12 21	12 34	12 47	13 01	13 16	13 31
10	13 44	13 58	14 13	14 28	14 44	15 02
11	15 07	15 22	15 38	15 55	16 15	16 34
12	16 31	16 48	17 06	17 25	17 45	18 06
13	17 55	18 13	18 33	18 54	19 16	19 39
14	19 18	19 39	20 00	20 23	20 47	21 12
15	20 43	21 05	21 28	21 52	22 18	22 45
16	22 08	22 32	22 56	23 23	23 50	24 20
17	23 34	23 59	24 25	24 53	25 23	25 55
18	24 59	25 26	25 54	26 25	26 57	27 31
19	26 25	26 54	27 25	27 58	28 32	29 07
20	27 53	28 23	28 56	29 31	30 07	30 45
21	29 20	29 53	30 27	31 03	31 42	32 23
22	30 48	31 22	31 58	32 37	33 18	34 03
23	32 16	32 51	33 30	34 12	34 56	35 43
23,31	33 03	33 40	34 20	35 03	35 48	36 35

A TABLE *of Amplitudes, fitting all Places from the Equinoctial to 60-Degrees of Latitude, either North or South.*

The Degrees of Latitude.

Sun's Decl.	49	50	51	52	53	54
Degrees of Declination.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.
0	00 00	00 00	00 00	00 00	00 00	00 00
1	01 31	01 33	01 35	01 37	01 39	01 42
2	03 03	03 06	03 10	03 15	03 20	03 24
3	05 34	04 40	04 46	04 52	04 59	05 06
4	06 06	06 14	06 22	06 30	06 39	06 49
5	07 38	07 48	07 58	08 08	08 19	08 31
6	09 10	09 21	09 33	09 46	10 00	10 15
7	10 42	10 55	11 09	11 24	11 40	11 57
8	12 14	12 29	12 45	13 02	13 21	13 41
9	13 47	14 05	14 24	14 43	15 04	15 26
10	15 21	15 40	16 01	16 23	16 46	17 11
11	16 54	17 16	17 39	18 03	18 29	18 57
12	18 28	18 52	19 18	19 44	20 12	20 43
13	20 03	20 29	20 57	21 26	21 57	22 30
14	21 38	22 06	22 37	23 08	23 42	24 18
15	23 14	23 45	24 18	24 52	25 28	26 07
16	24 51	25 24	25 59	26 36	27 16	27 58
17	26 28	27 03	27 41	28 21	29 04	29 50
18	28 06	28 43	29 24	30 07	30 53	31 42
19	29 45	30 25	31 08	31 55	32 45	33 38
20	31 25	32 08	32 54	33 46	34 39	35 35
21	33 06	33 52	34 41	35 34	36 31	37 32
22	34 48	35 37	36 30	37 27	38 29	39 36
23	36 33	37 26	38 23	39 24	40 29	41 40
23,31	37 26	38 20	39 19	40 23	41 32	42 46

A TABLE *of Amplitudes, fitting all Places from the Equinoctial to* 60 *Degrees of Latitude, either North or South.*

The Degrees of Latitude.

Degrees of Declination.

Sun's Decl.	55		56		57		58		59		60	
	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.
0	00	00	00	00	00	00	00	00	00	00	00	00
1	01	45	01	47	01	50	01	53	01	56	02	00
2	03	29	03	34	03	40	03	46	03	53	04	00
3	05	14	05	22	05	31	05	40	05	50	06	00
4	06	59	07	10	07	22	07	34	07	47	08	01
5	08	44	08	57	09	11	09	26	09	43	10	02
6	10	30	10	47	11	04	11	22	11	42	12	04
7	12	15	12	35	12	56	13	18	13	41	14	06
8	14	02	14	24	14	48	15	14	15	41	16	10
9	15	49	16	14	16	41	17	10	17	41	18	14
10	17	37	18	05	18	35	19	07	19	41	20	18
11	19	26	19	57	20	29	21	04	21	43	22	26
12	21	15	21	49	22	25	23	04	23	47	24	34
13	23	05	23	43	24	23	25	07	25	54	26	45
14	24	56	25	37	26	21	27	09	28	01	28	56
15	26	49	27	34	28	22	29	14	30	10	31	10
16	28	43	29	32	30	24	31	21	32	22	33	27
17	30	39	31	31	32	27	33	28	34	32	35	47
18	32	35	33	33	34	34	35	40	36	52	38	10
19	34	35	35	36	36	43	37	54	39	13	40	37
20	36	36	37	42	38	53	40	12	41	37	43	10
21	38	39	39	51	41.	09	42	34	44	05	45	47
22	40	47	42	04	43	27	44	59	46	40	48	32
23	42	56	44	19	45	50	47	30	49	21	51	24
23,31	44	06	45	32	47	05	48	49	50	44	52	53

The Uſe of this Table of AMPLITUDES.

THE *Amplitude*, is the Diſtance of Riſing or Setting of the Sun or Stars from the *Eaſt* or *Weſt* Points of the Horizon.

And *Note*, The Sun or Star having *North* Declination, they riſe to the Northward of the *Eaſt*, and ſet to the Northward of the *Weſt*: But if their Declination be *South*, they riſe to the Southward of the *Eaſt*, and ſet to the Southward of the *Weſt*: And by theſe Tables is thus found.

Look the Latitude in the Head of the Table, the Declination in the firſt Column on the Left-hand, and in the common Angle of Meeting is the *Amplitude* deſir'd.

Example 1.

In the Latitude of 30 d. the Sun's Declination being 7 d. 0 m. *North*, I demand the *Amplitude*?

Anſw. The *Amplitude* is 8 d. 6 m. for under Latitude 30 d. and againſt Declination 7 d. you will find 8 d. 6 m. which is the *Amplitude* from the *Eaſt* Northward, at Sun-riſing, or from the *Weſt* Northward at Sun-ſetting. But if the Declination had been 7 d. 0 m. *South*, in Latitude 30 d. as aforeſaid, then the *Amplitude* would have been 8 d. 6 m. from the *Weſt* Southward at Sun-riſing, and 8 d. 6 m. from the *Weſt* Southward at Sun-ſetting.

If there be any odd Minutes of Declination, take the proportional Part.

Examp. 2. In the Lat. of 42 d. 30 m. the Sun's Declination being 12 d. 15 m. I demand the *Amplitude* ?

Anſw. The *Ampl*. is 16 d. 43 m. found as follows; According to the former Directions for the Lat. of 42 d.

and Declin. being	12 13	d. the *Amplitude* is	16 d. 17 d.	16 m. 38 m.
Subtract, and their Difference is			1 d.	22 m.

Then ſay; As 1 d. or 60 m. is to 1 d. 22 m. or 82 m. ſo is 55 m. to 20 m. found as here-under:

If 60 m.————82 m.————15 m.
15
410
82
6(0)123(0(20 m. proportional part.
030 Remainder.

Lat. 42 d. and Declin. 16 d. the Amplit. is 16 d. 16 m.
To it add proportional Part above ——0 d. 20 m.
Gives Amplit. for Declin. 12 d. 15 m. to be 16 d. 36 m.

D. M.
Again, for Lat. 43 d. and Dec. $\left\{\begin{matrix}12\\13\end{matrix}\right\}$ d. Amp. is $\left\{\begin{matrix}16 \cdot 30\\17 \cdot 54\end{matrix}\right.$
Subtracted makes Difference to be ——————1 · 24
Then ſay: As 60 m. is to 1 d. 24 m. or 84 m.
So is 15 m. to 21 m. found as here-under:

If 60 m.————84 m.————15 m.
15
420
84
6(0)126)0(21 m. proportional Parts,
06
00 Remainder.

Lat. 43 d. and Declin. 12 d. Amplitude is 16 d. 30 min.
To it add proportional Part above ————0 d. 21 min.
Gives for Declin, 12 d. 15 m. the Amplit. 16 d. 51 min.

Now becauſe the given Latitude 42 d. 30 m. is in the middle, between 42 d. and 43 d. therefore the Medium of the Amplitudes before found, is the Amplitude required, and is thus:

Lat. { 42 / 43 } d. Decl. 12 d. 15 m. the Ampl. is { 16. 36 m. / 16. 51 m.
Added together, is———————33 d. 27 m.
The half is the Amplitude required———16 d. 43 m.

Thus may the Amplitude be found for any odd Minutes of Latitude, or Declination, tho' the Table is Calculated for whole Degrees only.

By this Table the Variation of the Compaſs is moſt readily found; for by the *Azimuth Compaſs* find the Sun or Stars Magnetical Amplitude, at their Riſing or Setting; and the true Amplitude (according to the Latitude of the Place, and their Declination) by this Table the Difference of theſe Amplitudes (when both are *North*, or both *South*) but their Sum (if one *North*, the other *South*) is the Variation.

But by the *Rectifier* it's moſt eaſily done thus.

Bring the Magnetical Amplitude (on the upper Compaſs) right againſt the true (on the lower) then doth the *North* Point in the upper ſtand againſt the Variation in the lower; and the upper Compaſs is explained in all it's Parts by the lower.

Examp. 1. Suppoſe the Magnetical Amplitude at Riſing (found by the *Azimuth Compaſs*) be *Eaſt* Southerly 15 deg. 30 min. and the true Amplitude (according to the Latitude of the Place, and Declination of the Object obſerved be *Eaſt* Southerly 26 d. 45 m. I demand the Variation of the Compaſs?

By the RECTIFIER.

Bring 15 d. 30 m. *Eaſt* Southerly on the upper Compaſs, againſt 26 d. 45 m. *Eaſt* Southerly on the lower; then doth the *North* Point, on the firſt, ſtand right againſt 11 d. 15 m. *North* Eaſterly, on the latter; ſo that the Compaſs doth vary 11 d. 15 m. or one Point *Eaſt*.

Example 2. { True / Magnet. } Ampl. { 07 d. 00 m. *Eaſt* Northerly. / 15 d. 30 m. *Eaſt* Southerly.
I demand the Variation of the Compaſs?

By the RECTIFIER.

Bring 15 d. 30 m. *Eaſt* Southerly on the upper Compaſs, againſt 7 d. *Eaſt* Northerly on the lower; then *North* on the firſt, ſtands againſt 22 d. 30 m. *North* Weſterly; that is, 22 d. 30 m. or 2 Points Variation *Weſt*.

In like manner do for any, and the Variation is moſt readily found.

The Deſcription and Uſe of Inſtruments moſt uſeful in *Navigation*.

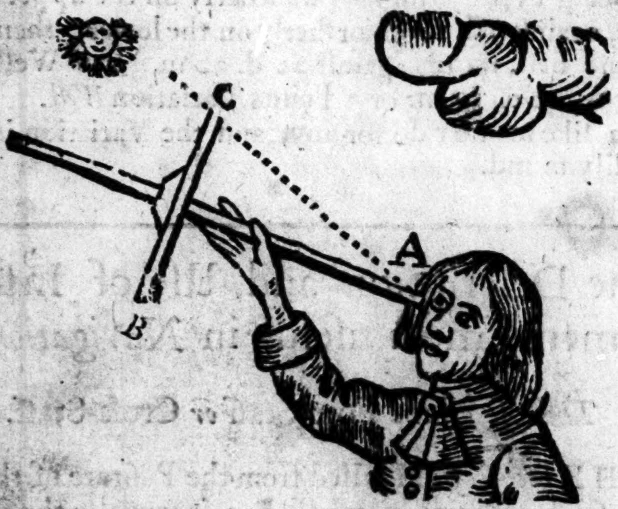
The Uſe of the Fore-Staff *or* Croſs-Staff.

THE *Fore-ſtaff*, ſo called from the Poſiture of the Obſerver in uſing it, whoſe Face is towards the Thing obſerved, generally; tho' for the Sun it's ſo contrived (for preſerving the Eye) to be uſed backward: It's called a *Croſs-ſtaff* from it's Form, being a ſquare Staff with 3 or 4 piece a croſs it, which are all called *Croſſes*.

The Staff is uſually about 30 Inches or 3 Foot long, and more than half an Inch ſquare, having 4 ſides, each graduated unequally like a Scale of Tangents, to each of them belongs a diſtinct Croſs; tho' ſometimes the ſhorteſt Croſs is made to ſerve two fieds of the Staff; that is, the Breadth is for the Ten-Croſs, and Length for the Thirty-Croſs; Beſides this, it hath two Croſſes more, the longeſt is the Ninety-Croſs, the other the Sixty-Croſs; theſe four Croſſes are thus to be underſtood: The

10	Croſs, belongs to that ſide beginning at	3	and ending at	10
30		10		30
60		20		60
90		30		90

The Figure of the Fore-Staff.



The Uſe of the Fore-Staff.

IT's common and ordinary at Sea, to take the Meridian Altitude of the Sun or Stars with this Inſtrument, and by it find the Latitude they are in.

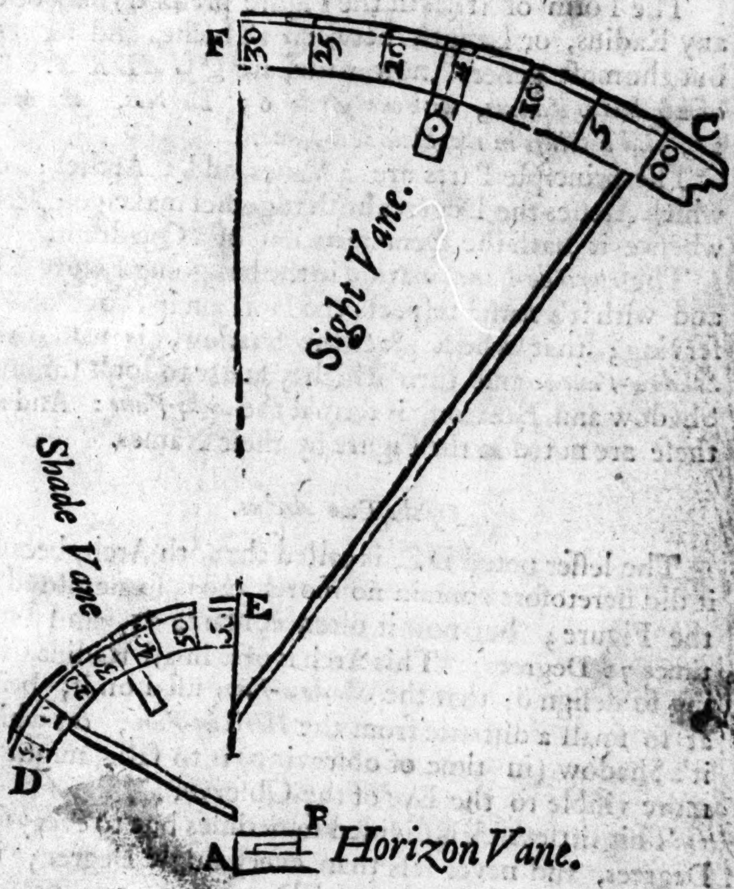
To perform which, take notice of theſe Precepts following:

1. *Note*, The 10, 30, 60 and 90 Croſſes, are to be uſed according as the Meridian Altitude is more or leſs; that is, if leſs than 10 d. uſe the 10 Croſs; if between 10 and 30 d. uſe the 30 Croſs; if between 30 and 60 d. the 60 Croſs; if more than 60 d. uſe the 90 Croſs.

2. Having conſidered which Croſs (according to the judged Altitude of the Object intended to be obſerved) is ſuitable put it on the Staff, ſo that the flat ſide of the Croſs may be towards the flat end of the Staff: Then,

3. Hold the flat end of the Staff (as A) to the Corner of

The Figure of the QUADRANT.



The

The Deſcription and Uſe of the QUADRANT.

THIS Inſtrument, called a *Quadrant*, firſt invented by our Country-man Capt. *Davis*, and thence call'd *Davis's Quadrant*, is of a very commodious Form; at preſent, the moſt general approv'd Inſtrument at Sea, for obſerving the Sun's Meridian Altitude.

The Form of it (as in the Figure prefix'd) may be of any Radius, or Length between 18 Inches and 3 Feet; but the moſt general now made, are *QUADRANTS of 26 Inches Radius, with one Arch 65 Degrees, the other 25, and a Glaſs in the Shaddow-Vane.*

The principle Parts are 3 Vanes and 2 Arches; on which Arches the Degrees both together make 90; from whence it hath the Denomination of a Quadrant.

The *Horizon-Vane* (mark'd in the foregoing Figure A B. and with it's name reſpects the Horizon in Time of obſerving; that which gives the Shadow, is nam'd the *Shadow-Vane*: and thro' which you are to look for both Shadow and Horizon, is term'd the *Sight-Vane*: And all theſe are noted in the Figure by their Names.

Of the Two Arches.

The leſſer noted D E, is called the 60th Arch, becauſe it did heretofore contain no more, and is ſo numbred in the Figure; but now it often contains 65, and ſometimes 70 Degrees: This Arch is of a ſmall Radius, being ſo deſign'd, that the *Shadow-Vane* uſed on it, being at ſo ſmall a diſtance from the *Horizon-Vane*, on which it's Shadow (in time of obſerving) is to fall, might be more viſible to the Eye of the Obſerver.

This little Arch is divided ſometimes but to every five Degrees, and never leſs than every ſingle Degree; it's numbred from the upper-end D, with 5, 10, 15, 20, &c, downwards to E, where it ends in the Line A E F (a Line in the middle of the longer Leg of the *Quadrant*) at 60, 65, or 70 Degrees, according as the other Arch is divided ; ſo that the Numbers at E and F together, ever muſt make 90 Degrees.

The greater Arch CF, is call'd the 30th Arch ; it's of a large Radius, that it might contain the leſſer Subdiviſions of a Degree ; and being of a competent Breadth, thereon are uſually deſcrib'd 10 *Concentrick Circles*, interſected with 3 Diagonal Lines in each Degree, making each Interſection 2 m.

This great Arch is divided on the Limb into Degrees by long Stroaks, each again ſubdivided into 6 equal parts by ſhorter Stroaks, each ſmall Diviſion being 10 Minutes, and are numbred from the lower-end C, with 5, 10, 15, &c. upward to F, where it ends in the Line AEF at 20, 25, or 30 Degrees: The Figures at F and E together make 90 ; and in the Figure are 30 and 60.

The Uſe of the QUADRANT.

THIS Inſtrument is rarely us'd otherwiſe than to obſerve the Sun's Meridian Altitude ; which to perform, I thus deſcribe.

1. Put the *Horizon-Vane* AB on the End A, and home to the Center A ; the *Sight-Vane*, put on the Arch CF, cloſe to the Back of it ; the *Shadow-Vane* on the little Arch DE, home to the Back of it, and the upper-edge of the *Vane* ſet to a Number of Degrees, leſs than the Complement of the Altitude by 15 or 20 Degrees.

2. The *Vanes* being thus fix'd upon the *Quadrant*, turning your Back towards the Sun, the End C in your Hand, and F uppermoſt, look through the *Sight-Vane*, cauſing the upper-edge of the ſhade of the *Shadow-Vane*, to lie upon the upper-edge of the Slit in the *Horizon-Vane*, where is drawn a Black Line at the ſame time, if the *Horizon* appear thro' the ſaid Slit in the *Horizon-Vane*, the *Vanes* on the *Quadrant* ſtand at the Sun's preſent Altitude.

3. But if the Sky appear inſtead of the Horizon, ſlide the *Sight-Vane* a little higher towards F: On the contrary, if the Sea appear inſtead of the Horizon, then ſlide the *Sight-Vane* lower towards C; continue ſo to do, till the Horizon appear thro' the *Horizon-Vane*.

4. In order to obtain the Meridian Altitude (which is the greateſt the Sun will have that Day, and the Thing us'd to find the Latitude) continue obſerving; and as the Sun riſes, the Sea will appear thro' the *Horizon-Vane*; and the *Sight-Vane* muſt be ſlid lower accordingly; Thus do, obſerving as often as may be convenient, till the Sun is at the higheſt.

5. When the Sun begins to fall, the Sky will appear (thro' the *Horizon-Vane*) inſtead of the Horizon; then deſiſt obſerving for that Day.

6. Having thus done, add the Degrees the upper edge of the Vane ſtandeth at to the Degrees and Minutes cut by the inſide of the *Sight-Vane*, their Sum is the Complement of the Sun's Meridian Altitude, or the Diſtance of the upper-edge of the Sun from the Zenith; to which Sum add 16 m. the Sun's Semidiameter; and this laſt Sum is the Diſtance of the Sun's Center from the Zenith, being the true Complement of the Sun's Meridian Altitude.

Note, The upper-edge of the ſhade of the *Shadow-Vane* reſpects the upper Limb of the Sun; and the lower-edge of the ſaid ſhade, anſwers to the lower Limb of the Sun; ſo that obſerving by the firſt, you are to add 16 m. to, or from what's on the *Quadrant*; the Sum or Difference, is the Diſtance of the Sun's Center from the Zenith, call'd his *Zenith Diſtance*, or Complement of his *Meridian Altitude*.

Thus I have ſhew'd how to take an Obſervation with the *Quadrant*, I come now to ſhew how to work it. The difference in working an Obſervation taken by the *Fore-ſtaff* and the *Quadrant*, is only this: By the *Fore-ſtaff* you take the Altitude, by the *Quadrant* the Complement of the Altitude, or the Diſtance of the Sun from the Zenith: Altitude is the Diſtance of the Sun from the Horizon; therefore if you ſubtract the Complement of the Altitude from 90 d. the Remainder is the Altitude, which you may uſe as in the Uſe of the *Fore-Staff*.

But it is uſual to work Obſervations (made by the *Quadrant*) by the Complement of the Sun's Meridian Altitude; I will therefore give ſome general Rules, and ſome particular Examples for their Explanation.

The General RULES *are*,

1. IF the Sun hath *North* Declination, and upon the Meridian to the Southwards of the Obſerver, add the Sun's Declination to the Zenith Diſtance or Complement of the Sun's Meridian Altitude the Sum is the Latitude you are in, *North*.

2. If the Sun be to the Southward of you, and hath *South* Declination, ſubtract the Sun's Declination from the Zenith Diſtance, the Remainder will be the Latitude you are in, *North*: But if the Declination exceed the Zenith Diſtance, ſubtract the leſſer from the greater, and the Remainder is the Latitude *South*.

3. If the Sun be to the Northward of you, and hath *South* Declination; add the Sun's Declination to his Zenith Diſtance, the Sum will be the Latitude *South*.

4. If the the Sun be to the Northward of you, and hath *North* Declination, ſubtract the Sun's Dcelination from his Zenith Diſtance, the Remainder will be the Latitude *South*: But if the Declination exceed the Zenith Diſtance, ſubtract the leſſer from the greater, and it gives the Latitude *North*.

I might have been larger in givng more general Rules; but if you underſtand thoſe 8 Rules for the Uſe of the *Fore-Staff*, you cannot err in theſe, uſing the *Quadrant*: And for their Explanation, the Examples follow.

The Rules explained by Examples of obſerving in North *Latitude.*

Example 1

ON the 10th of *April* 1717, the Sun came to the Meridian in the *South*; and, by Obſervation, found his Zenith Diſtance, or Complement of his Meridian Altitude, to be 34 d. 47 m. that is, his upper Limb was ſo much from the Zenith; I demand the Latitude of the Place of Obſervation.

		d.	m.	
Complement of the Meridian Altitude		34	47	*South.*
The Sun's Semidiameter	add	00	16	
Diſt. of the Sun's Center from the Zenith		35	03	*South.*
Declination *North*	add	11	55	*North.*
Latitude of the Place required		46	58	*North.*

Example 2.

The 14th Day of *Auguſt*, *Anno.* 1717, I find the Complement of the Sun's Meridian Altitude, by Obſervation, to be 28 d. 48 m. *South*; I demand the Latitude the Ship is in?

		d.	m.	
Complement of the Meridian Altitude		28	48	*South*
Sun's Semidiameter	add	00	16	
Diſt. of the Sun's Center from Zenith		29	04	*South.*
The Declination	add	10	52	*North.*
Latitude the Ship is in.		39	56	*North.*

Example 3.

September 13, 1717. I find the Complement of the Sun's Meridian Altitude, by Obſervation, to be 47 d. 35 m. *South*; I demand the Latitude I am in?

Com-

		d.	m.	
Complement Meridian Altitude		47	35	*South.*
Sun's Semidiameter	add	00	16	
Diſtance of the Sun's Center from Zenith		47	51	*South.*
The Declination	ſubt.	00	13	*South*
Latitude the Ship is in		47	38	*North.*

Example 4.

The 15th day of *November*, *An.* 1717, I find the Complement of the Sun's Meridian Altitude, by Obſervation to be 52 d. 0 m. *South*; I demand the Lat. the Ship is in?

		d.	m.	
Complement of the Meridian Altitude		52	00	*South*
Sun's Semidiameter	add	00	16	
Diſtance of the Sun's Center from Zenith		52	16	*South.*
The Declination	ſub.	18	45	*South.*
Latitude the Ship is in		33	31	*North.*

Example 5.

The 27th of *May* 1718, the Sun to the Northward of me; and the Complement of the Meridian Altitude by Obſervation to be 10 d. 15 m. I demand the Latitude the Ship is in?

		d.	m.	
Sun's Declination		22	49	*North.*
Complement of Meridian Altitude		10	15	
The Sun's Semidiameter	add	00	16	
The true Zenith Diſtance	ſubt.	10	31	*North.*
Latitude the Ship is in		12	18	*North.*

Example 6.

Admit the 29th of Day *June*, *Anno* 1718, The Sun upon the Meridian, I find by Obſervation, the upper Limb of the Sun is 6 d. 42 m. to the Northward of my Zenith; I demand the Latitude I am in?

d. m.
Sun's Declination ———————— 22 . 26 *North.*
Sun's Semidiameter ———————— add 00 . 16
Sun's ſupreme Marg. diſt. from Zentih 06 . 42
Diſt. of Sun's Center from Zenith ſubt. 06 . 58 *North.*
Latitude the Ship is in ———————— 15 . 28 *North.*

Example 7.

The 21ſt of *July*, *An.* 1718, in Longitude 165 d. *Weſt*, and the Sun being upon the Meridian, I find by Obſervation, the ſupreme Margin of the Sun is 16 d. 45 m. to the Northward of my Zenith; I demand the Latitude the Ship is in?

d. m.
The Declination ———————— 18 . 15 *North.*
Proportional Minutes ———————— ſubt. 00 . 06
Sun's Declination in the Meridian given 18 . 09 *North.*
Sun's ſupreme Margin. diſt. from Zenith 16 . 45 *North.*
Sun's Semidiameter ———————— add 00 . 16
Sun's Center diſtant from Zenith ———— 17 . 01 *North.*
Latitude the Ship is in ———————— 01 . 08 *North.*

The Rules explain'd by Examples of Obſervation in South Lat.

Example 1.

THE 15th Day of *July*, *An.* 1718, in Longitude 150 d. *Eaſt*, and the Sun being upon the Meridian, I find the Complement of his Meridian Altitude, by Obſervation, to be 48 d. 28 m. *North*; I demand the Lat. the Ship is in?

d. m.
Complement of the Meridian Altitude — 48 . 28 *North.*
Sun's Semidiameter ———————— add 00 . 16
Sun's Center diſtant from the Zenith 48 . 44 *North.*
The Declination ———————— ſubt. 19 . 47 *North.*
Latitude the Ship is in ———————— 28 . 57 *South.*

Examp. 2.

The 29th of *October*, *An.* 1718, in Longitude 120 d. *Weſt*, and the Complement of the Sun's Meridian Altitude, by Obſervation, is 27 d. 29 m. *North* ; I demand the Latitude the Ship is in?

		d.	m.	
Complement of Meridian Altitude		27	29	*North*
Sun's Semidiameter	add	00	16	*South*
Sun's Center from the Zenith		27	45	*North*
The Declination	add	15	46	*South.*
Latitude the Ship is in		43	31	*South.*

Example 3.

Admit the 25th of *December*, *Anno* 1718, I find the Sun upon the *South* part of the Meridian, and, by Obſervation, the Complement of the Sun's Meridian Altitude 15 d. 10 m. I demand the Latitude the Ship is in?

		d.	m.	
Complement of the Meridian Altitude		15	10	*South.*
Sun's Semidiameter	add	00	16	
Sun's Center from the Zenith	ſubt.	15	26	*South.*
The Declination		22	45	*South.*
Latitude the Ship is in		07	19	*South.*

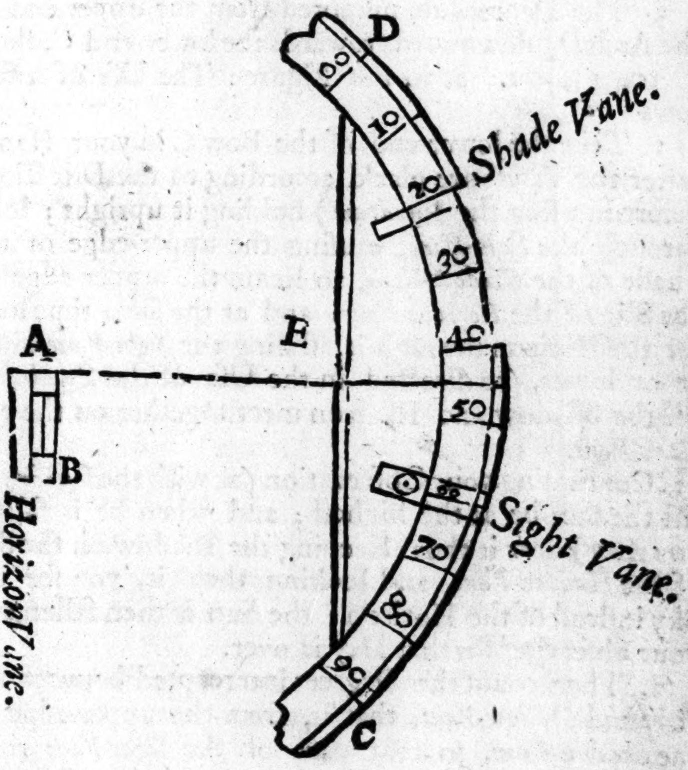
Thus much I thought neceſſary to add by way of Explanation of the fore-going Rules, which ſhew a perfect Way of Obſerving ; that is, how to take and Work an Obſervation with more Exactneſs than hath been formerly us'd.

Note 1. The Sun's Semidiameter, here added to the Complement of its Meridian Altitude, may be contriv'd ſo on the *Quadrant*, that its Addition by the Pen may be omitted ; for this purpoſe the *Quadrants* made by *James Atkinſon* at *Cherry-Garden-Stairs* on *Rotherhith-Wall*, have on the back-edge of the little Arch, (every 5 d. numbred, differing from thoſe on its flat ſide, the Semidiameter of the Sun: So that placing the upper-edge of the *Shadow-Vane* to the Degree on the foreſaid back-edge of the Arch, the *Quadrant* then ſheweth the true Complement of the Altitude, or the Diſtance of the Sun's Center from the Zenith; which prevents adding 16 m. after obſerving.

2. There is another Contrivance of late, which is putting a Convex-Glaſs in the middle of the Edge of the *Shadow-Vane*; which Glaſs in time of obſerving, is to caſt an illuminated Spot on a round black Spot made in the *Horizon-Vane*: This is uſeful when the edge of the ſhade of the *Shadow-Vane* is not very conſpicuous; that being diſcernable when the latter is not. The manner is thus:

Set that part of the *Shadow-Vane* which is right againſt the middle, or Center of the Glaſs, to the Degrees, on the little Arch; and then cauſe the enligtened Spot of the Glaſs to lie on a black Spot or Circle on the *Horizon-Vane*; at the ſame time look for the Horizon through it, as before directed; ſo will you have (obſerving by this Glaſs in the *Vane*) the true Complement of the Sun's Altitude, or the Diſtance of his Center from the Zenith.

The Figure of the BOW.



The Deſcription and Uſe of the BOW.

1. THIS Inſtrument conſiſteth of two Parts, (making the Figure ACD) beſides the 3 *Vanes* which are the ſame for kind with thoſe us'd with the *Quadrant*. The Parts are the Arch CD, and the Radius AE; this latter ſlips in a Socket, ſo as to be taken out, for convenience, to lie in a little room.

2. The 3 Vanes are the ſame as before deſcrib'd in the Quadrant, and their Names are inſerted in the Figure of the Bow prefix'd.

3. The Degrees are numbred from the upper-end of the Arch D, downwards towards the lower-end C, thus, 5, 10, 15, *&c.* as in the Figure: The Uſe of it follows:

1. Take the lower-end of the Bow C in your Hand, (after the Vanes are plac'd according to the Directions before in uſing the *Quadrant*) holding it upright; look through the *Sight-Vane*, cauſing the upper-edge of the Shade of the *Shadow-Vane*, to lie on the upper-edge of the Slit of the *Horizon-Vane*; and at the ſame time look for the Horizon through it, ſliding the *Sight-Vane* higher or lower, (as directed in the Uſe of the *Quadrant*) till tbe Shadow and Horizon meet together on the *Horizon-Vane*.

2. Continuing your Obſervation (as with the *Quadrant*) till the Sun be at the higheſt; and when he is fallen, you may know it thus: Keeping the Shadow on the Slit of the *Horizon-Vane*, and looking thro' it, you ſee the Sky inſtead of the Horizon; the Sun is then fallen, and your obſerving for that Day is over.

3. Then count the Degrees intercepted between the *Sight* and *Shadow-Vane*, that is, from the upper-edge of the *Shadow-Vane*, to that part of the *Sight-Vane* right againſt the middle of the Eye-hole in it, they ſhew the Sun's Altitude: Or thus, ſubtract the Degrees at the *Shadow-Vane*, from thoſe (at the ſight) of the *SightVane*, the Remainder is the Sun's Altitude or Diſtance of this upper Limb from the Horizon; from which ſubtract 16 Minutes, ſo have you the Altitude of his Center: But if the *Shadow-Vane* have a Glaſs in it, and the Obſervation be made by it (as before directed, in its uſing with a *Quadrant*) the Inſtrument ſheweth the true Altitude, without the Subtraction of 16 Minutes for the Sun's Semidiameter.

To

To find the Latitude in Obſerving by the BOW.

The ſame Rules given in obſerving by the *Foreſtaff*, are to be follow'd here, or ſubtract what the *Bow* ſheweth from 90 d. and then the Rules for the *Quadrant* are to be obſerv'd, in order to find the Latitude.

The Deſcription and Uſe of the NOCTURNAL.

1. THE *Nocturnal* conſiſts of 3 Parts; the firſt, term'd the unmovable Part, is the broadeſt and greateſt, to which is a Handle to hold it by in time of Obſervation.

On the fore-ſide of which, in the uttermoſt Circle, are the 12 Months, and each Month divided into its reſpective Days, or at leaſt every two Days: They are counted towards the Right-hand, mark'd with their Names, or the firſt 3 Letters thereof; as *Jan.* for *January*, *Feb.* for *February*, *Mar.* for *March*, &c. Within the Circle of Months, is a Circle divided into 24 equal Parts or Hours, each Hour divided into Halfs or Quarters, us'd to find the time of *Full-Sea* or *High-Water*.

On the back-ſide of this Part are the 32 Points of the Compaſs, *South* uppermoſt, and *Eaſt* on the Left-hand; to each Point is ſet the Declination of the *North-Star* above or under the Pole, which is known by *Und.* for *Uuder*, and *Ab.* for *Above*.

There have formerly been made two ſorts of *Nocturnals*, one for the *Great Bear*, the other for the *Little Bear*: Thoſe made for the Guards of the *Great Bear*, or *Charles's Wain*, commonly called the 2 *Pointers*, have *February* at the top; but thoſe made for the Guards of the *Little Bear*, have *April*: But they are now made for both *Bears* in one *Nocturnal*; and are known by having either 2 Circles of Months, mark'd GB, and LB, or 2 ſhort Teeth or Indexes, proceeding from the ſecond or middle Part of it.

2. The ſecond moveable middle-part, hath 2 Circles on it; the outermoſt is divided into the 29 Days and ½ of the Moon's Age; the innermoſt into 24 equal Parts, or Hours, each Hour ſubdivided into Halfs and Quarters; this part hath a Tooth, or ſhort Index, proceeding from it, with the Edge continu'd in a right Line from the Center; which is to be ſet to the Day of the Month when us'd: Some have 2, mark'd G on one, and L on t'other; G ſtanding for *Great Bear*, and L for *Little Bear*; ſignifying the Nocturnal is made for both Bears, and may be uſed for either.

3. The third and moveable Part, is call'd the *Index*, its uppermoſt on the foreſide of the Inſtrument, having one Edge proceeding in a right Line from the Center, (which in time of Obſervation) muſt be turn'd to the Guards: Thro' all 3 pieces, in the Center of the Inſtrument is a Hole, thro' which you are to ſee the *North-Star*, when the *Index* is turn'd to the Guards.

The Uſe of the NOCTURNAL.

BY it may be found the Hour of the Night, the Bearing of the Guards, and the Declination of the *North-Star* from the Pole, by which may be found the Latitude, as ſhall be ſhewn in order.

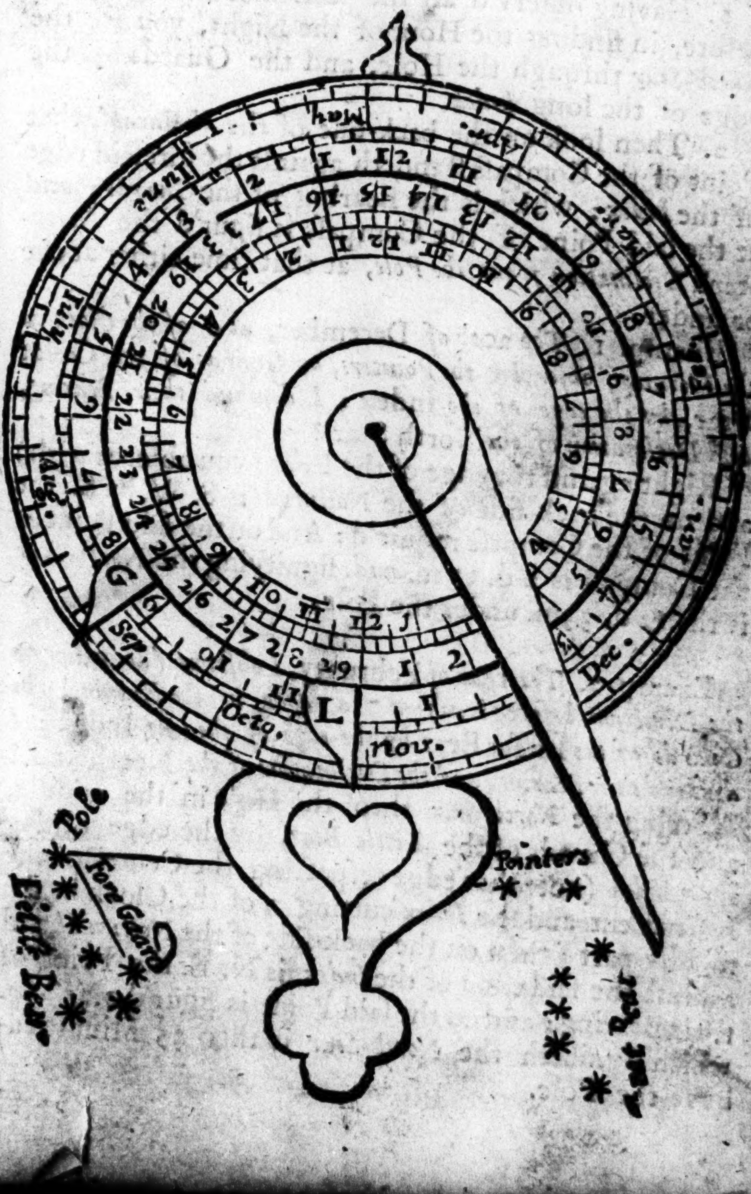
1. *To find the Hour of the Night.*

1. Place the the *Index* of the ſecond or middle Piece, to the Day of the Month, where it's to be kept till the Obſervation is ended: Then taking the Handle in your Hand, with the foreſide towards you.

2. And holding it upright (which you may diſcern when you do ſo, by the tip on the top of the firſt or great Part of the Nocturnal) look thro' the Hole in the Center for the *North-Star*.

3. Turn that edge of the long *Index*, which proceedeth from the Center to the Guards, ſeeing at the ſame time the *North-Star* thro' that Hole: Then will the *Index* ſhew the Hour of the Night, on the ſecond or middle Part.

The Figure of the *Nocturnal.*



2. *To find the Bearing of the Guards either of the* Little *or* Great Bear; *that is, upon what Point of the Compaſs they are.*

1. Having obſerv'd all the particular Directions, as before, in finding the Hour of the Night, you ſee the *North-Star* through the Hole, and the Guards by the edge of the long *Index.*

2. Then look on the back-ſide of the *Nocturnal*, what Point of the Compaſs ſtandeth againſt the foreſaid edge of the *Index*; which is the Bearing of the *Guards*; and at the ſaid Point of the Compaſs is figur'd the *North-Star's Declination from the Pole*, at that time either above or under.

Examp. 1. *The 20th of* December, *at 6 of the Clock in the Morning, obſerving the Pointers, or Guards of the* Great Bear, *by the edge of the* Index; *I demand their Bearing, and Declination of the* North Star?

Right againſt the edge of the *Index* (you obſerve with) and on the back-ſide of the *Nocturnal* is S. W. by S. the Point of the Compaſs requir'd: And on the ſaid Point of the Compaſs is 2 d. 33 m. *und.* ſignifying the *North-Star* is then 2 d. 33m. under the Pole.

Examp. 2. *The 14th of* February, *I obſerve (according to the Directions before given) at 7 a Clock in the Evening, the Guards of the* Little Bear *by the edge of the long* Index; *I demand their Bearing, and the Declination of the* North Star?

Seeing the *North-Star* thro' the Hole in the middle, and the Guards of the *Little Bear*, by the edge of the long *Index* (note that edge reſpecting the Center of the Inſtrument and the *Index* cutting 7 of the Clock in the middle-part; then on the back-ſide of the *Nocturnal*, and againſt the ſaid edge of the *Index*, is N. E. the Point of their Bearing; and on the ſaid Point is figur'd 0.35 *Abo.* which ſignifieth the *North-Star* is then 35 Minutes above the Pole.

† 3. To

3. *To find the Moon's Southing by the* Nocturnal

To do this, look for the Moon's Age in the outermoſt Circle, on the middle or ſecond piece of the *Nocturnal*; and right againſt it, in the innermoſt Circle of the ſame Piece, is the Southing.

Example. *If the Moon be* 19 *Days old; I demand her Southing?*

Right againſt 19, in the outermoſt Circle, is 3½ in the innermoſt Circle; which is half an Hour paſt 3 of the Clock in the Morning, the Time of the Moon's coming to the *South.*

4. *To find the Time of Full-Sea by the* Nocturnal.

1. Set the ſhort *Index* of the middle-part (if it have 2 *Indexes*, that which ſtands at 12) to the time of Full-Sea, on the new or Full-Moon (for the place propos'd) in the innermoſt Circle of the great piece.

2. Keeping that there, bring the long *Index* to the (Southing, or) Moon's Age on the middle Piece.

3. Then right againſt the long *Index*, and in the innermoſt Circle on the great Piece, in the time of Full-Sea requir'd.

Example, *The Moon being* 19 Days *old*; I *demand the Time of Full-Sea at* Graveſend?

1. Bring the *Index* or Tooth of the middle-part which ſtands at 12 to 1½ Hour, which is N. N. E. and S. S. W. the Point of the Compaſs making Full-Sea at *Graveſend* on the New, or Full-Moon, in the innermoſt Circle of 24 Hours on the great Piece; keeping that faſt there.

2. Turn the long *Index* to 19 Days, the Moon's Age, (or to 3½ Hours, the Moon's Southing) on the middle Piece.

3. Then right againſt the long *Index*, and in the innermoſt Circle on the great Piece, is 5 Hours; the time of Full-Sea, or High-water, in the Morning at *Graveſend.*

5. *To find the Latitude of any Place by the* Nocturnal, *and* Fore-Staff.

1. find the *North-Star*'s Declination from the Pole by obſerving with the *Nocturnal*, as directed in *Example* 1, and 2, of the 2d Uſe.

2. Then (at the ſame time) with a *Fore-ſtaff* take the Altitude of the *North-Star*.

3. If the *North-Star* be above the Pole, ſubtract it's Declination from; if under, add to it's Altitude; the Sum or Difference, is the Latitude requir'd.

Example 1. *Suppoſe the* 14*th of* February, *at* 7 *of the Clock in the Evening, obſerving with the* Nocturnal, *you find the Guards of the* Little Bear *to bear N. E. which is* 0 d. 35 m. *above the Pole; and at the ſame time by the* Foreſtaff, *find the Altitude of the* North-Star 42 d. 10 m. I *demand the Latitude of the Place?*

	d.	m.	
From the Altitude of the North Star —	42	10	
Subtract it's Declinttion above ———	00	35	
Remainder is the Latitude required	41	35	North:

Example 2. *The* 20*th of* December, *at* 6 *of the Clock in the Morning, obſerving with the* Nocturnal, *I find the Guards or Pointers of the* Great Bear *S. W. by S. which is* 2 d. 33 m. *under the Pole; and at the ſame time, by the* Fore-ſtaff, *find the Altitude of the* North Star 45 d. 22 m. *I demand the Latitude of the Place of Obſervation?*

	d.	m.	
To the Altitude of the North Star——	45	22	
Add it's Declin. from the Pole under —	02	33	
Sum is the Latitude requir'd ———	47	55	North

The Deſcription and Uſe of *Gunters's* SCALE.

THIS Inſtrument, for its quick and eaſy diſpatch of the moſt common and uſeful Proportions, deſerve as generally to be known in it's Uſes, as by it's Name: On that account, I'll touch a little on it's Deſcription, before I give you a taſt of it's manifold Uſes: as brief and plain as I can.

1. *Gunter*'s Scale (ſo called from Mr. *Gunter* it's firſt Contriver) is uſually made of Box-wood, of any Length and Breadth (but commonly 2 feet long, and 1 ½ Inch broad) on which are the Lines or Scales of Numbers, Sines, Tangents, *&c.* Of which are 2 ſorts, the long or *ſliding Gunter*, and the *ſliding Gunter*; on both ſorts are the ſame Lines, though differently uſed; the firſt with Compaſſes, the latter by ſliding.

2. The Lines (moſt uſual now) ſet on *Gunters* are 8, and have their Names at the right-hand end thereof, under oneanother thus; *Sine Rumb*, *Tang-Rumb*, *Numbers*, *Sines*, *Verſed Sines*, *Tangents*, *Meridian* (for Meridional Parts) and *Equal Parts*,

3. The *Sine-Rumb*, and *Tang-Rumb*, are both Points of the Mariners Compaſs; the firſt is figured from the left hand towards the right, with 1, 2, 3, 4, 5, 6, 7, and 8, at which is a Braſs Center-pin; the latter is figur'd thus, 1, 2, 3, and 4, at the ſaid Center-pin, and thence back again towards the left hand with 5, 6. and 7; each Point in both Lines, (where it can) is ſubdivided into Halfs and Quarters; theſe 2 Lines are cheifly uſeful in Navigation.

4 The next under *Tang-Rumb*, is the *Line of Numbers* figur'd thus; near the left-hand end, it begins at 1, and towards the right-hand, 2, 3, 4, 5, 6, 7, 8, 9; then 1 in the middle, at which is a Braſs Center-pin; going ſtill on 2, 3, 4, 5, 6, 7, 8, 9, and 10, at the end, where is another Center-pin: This Line is of the moſt general Uſe, and requires the larger Account of it: Whereſore take theſe following Notes for the *Line of Numbers*.

Note 1. *All the Figures on this Line may be taken ſingle as they ſtand; or be increaſed, or diminiſh'd at pleaſure* *ſo it be in decuple Proportion:* That is, the firſt 1 may be counted for 1, or 10, or 100, or 1000, &c. then the next 2 is accordingly 2 or 20, or 200, or 2000, *&c* Again, the firſt 1 may be reckon'd 1 tenth, or 1 hundredth, or 1 thouſandth Part, *&c.* then the next 2 is 2 tenths, or 2 hundredths, 2 thouſand Parts, *&c.* So that,

If the firſt 1 be taken for 1, the middle 1, is then 10, and 2 to its Right-hand is 20, 3 is 30, 4 is 40, and 10 at the end, is now 100: Again, if the firſt 1 be counted 10, the next 2 is 20, 3 is 30, and ſo on making the middle 1 now 100, the next 2 is 200, 3 is 300, 4 is 400, and 10 at the end is now 1000.

In like manner, if the firſt 1 be eſteem'd for 1 tenth, the next 2 for 2 tenths, and the middle 1 is 1, and next 2 is 2, and 10 at the end is now 10: Again, if the firſt 1 be counted for 1 hundredth Part, the next 2 is 2 hundredth Parts, the middle 1 is now 10 hundredth Parts or 1 tenth Part, and next 2 is 2 tenth Parts, and 10 at the end, is now but 1 whole number or Integer.

Note 2. *As the Figures are increas'd or diminiſh'd in their Value, ſo in like manner muſt all the intermediate Stroaks or Sub-diviſions be increas'd, or decreas'd*: That is, if the firſt 1 (at the Left-hand) be counted 1, then 2 (on the Right-hand of it) is 2, and each Sub-diviſion between them is now 1 tenth Part; and ſo all the way to the middle 1, which now is 10, the 2 next it, is 20; now the longer Stroaks between 1 and 2, are to be counted from 1 thus, 11, 12, (where is a Braſs-pin) then 13, 14, 15, (ſomething a longer Stroak than the reſt) then 16, 17, 18, 19, 20, at the Figure 2: And all the ſhorter Stroaks between theſe longer, are now each to be counted for 1 tenth Part, from the middle 1 to the next 2, now 20; from whence the longer Diviſions, between the Figures, are Units; thus, 21, 22, 23, *&c.* to 3 which is 30; and the ſhorter Diviſions, between them, each now is $\frac{1}{5}$ or 2 tenths of an Integer; from whence each ſhort Stroak or little Diviſion, is $\frac{1}{2}$ or 5 tenths of a Unit.

Again, if 1 at the Left-hand be 10, the Figures between it and the middle 1, are common Tens, and the Subdiviſions (between each Figure) are Units; and from the middle 1 to 10 at the end, each Figure is ſo many hundreds; and between theſe Figures each longer Diviſion are Tens; and from the middle 1 to 2, each leſſer Diviſion is 1 Unit; from 2 to 3 each leſſer Stroak is 2 Units, from the Figure 3 to the end, each ſhorter Stroak is 5 Units.

Note 3. On the *Line of Numbers*, may be counted a Number of any Denomination; whether Meaſure, as Inches, Feet, Yards, Miles, Leagues, *&c.* or Weight; as Hundreds, Pounds, Ounces, *&c.* or Money; as Pounds, Shillings, *&c.* or Time; as Years, Months, Days, Hours, *&c.* provided always the *Integer* be divided, or ſuppos'd to be divided *decimally*.

5. Next under *Numbers* is the Line of *Sines*, beginning at the Left-hand at about 25 Minutes, and figur'd thus; 1, 2, 3, *&c.* to 10; then 20, 30, 40, *&c.* to 90, ending at the Right-hand, where is a Braſs Center-pin: *Theſe Figures never change their Value nor Denomination, being here (and in all the other Lines under it)* Degrees,

From the Beginning of this Line to 10 Degrees, each Degree is divided into 12 Parts, by greater and leſſer Stroaks, making each 5 Minutes; from 10 Degrees to 20, each ſmaller Stroak is 10 Minutes; from 20 to 30, each is 15 m. from thence to 60, ſome are 20, but the moſt are 30 m. each leſſer Subdiviſion; and from 60 to 80, each Diviſion is a Degree; 80 and 90 are ſo near together, that it admits but one Stroak between, which is for 85 Degrees.

6. Next to, and abutting on the Line of *Sines*, is the *Verſed Sines*, beginning at the Right-hand (againſt 90 in the *Sines*) and from thence figur'd towards the Left-hand thus, 10, 20, 30, 40, *&c.* ending at the left-end at about 160 Degrees; the Subdiviſions are thus, from 10 to 30,

each is 2 Degres; from thence to 90, it's ſingle Degrees; from thence to 120, it's ½ Degrees; and from thence to the end it's divided into ¼ d. or each 15 Minutes.

7. Under *Verſed Sines* is the *Line of Tangents*, beginning at the left end, as the *Sines* do; from thence figur'd to the Right-hand thus, 1, 2, 3, *&c.* to 10; and ſo on, 20, 30, 40, and 45 on the Right-hand, where is a little Braſs Center-pin, juſt under and even with that in the *Sines*; from thence back again, is figur'd 50, 60, 70, 80, *&c.* to 89; ending at the left end, where it began at 1 Degree: The Subdiviſions of this Line, are (for the moſt) like thoſe of the *Sines*; ſo paſſing that, I proceed,

8. Next to the *Tangents*, and under it is the *Line of Meridional Parts*, beginning at the Right-hand, is figur'd thus, 10, 20, 30, *&c.* to the Left-hand, where it ends at 86 Degrees: This Line, with the Line of equal Parts under it, are us'd together, and only in that Part of *Navigation*, call'd *Mercator's Sailing*: The uppermoſt Line contains the Degrees of the Meridian, or Latitude in a Mercatory Chart; and the lower, as the Equinoctial, the Degrees of Longitude.

9. Theſe 8 Lines now deſcrib'd, are ſet on the *Sliding Gunter*, but not in the ſame Order, being ſome on one ſide, and ſome on t'other; alſo the Lines of Numbers, Sines and Tangents, are ſet double, that is, One on each ſide, as the middle piece ſlide: Which middle piece is ſo contriv'd to ſlip to and fro eaſily, to ſlide out, and to be put in any ſide uppermoſt, in order to bring thoſe Lines together (or againſt one another) moſt proper for ſolving the Queſtion, wrought by the *Sliding Gunter*: Of which, let this ſhort Deſcription ſuffice.

I. *The Uſe of* Gunter's Scale, *both ſingle and ſliding.*

IN order to a right underſtanding of the Uſes of this Scale, it is neceſſary to number well on them; that is, to find readily a Place repreſenting any given Number, and that chiefly on the Line of Numbers; which is as follows,

PROBLEM I.

To find a Whole Number on the Line of Numbers.

Rule.

1. LOOK the firſt Figure of the given Number among the figur'd Diviſions.

2. For the ſecond Figure, count ſo many Tenths or of the longer Stroaks from the figur'd Diviſion, towards the Right-hand, as are Units in the ſaid ſecond Figure.

3. Then for the third Figure, count from the laſt Tenth (repreſenting the ſecond Figure) ſo many leſſer Stroaks or Centeſms as that Figure hath Units.

4. In like manner for the fourth Figure, count from the laſt Centeſm, ſo many Thouſands or leſſer Stroaks as are Units in it; and ſo on for more Figures; though four Figures or Thouſands, are as many as well can be diſcern'd on a Two-Foot *Gunter*.

5. This done, the laſt Place is the Point where the propounded Number is repreſented.

Example 1. *To find the Point in the Line of Numbers that doth repreſent* 12.

According to the Rule above, I take the Diviſion at the Figure 1, in the middle of the Line of Numbers for the firſt Figure of 12. the propounded Number; then for 2 the ſecond Figure, I count two Tenths or longer Stroaks to the right-hand from the ſaid Stroak at 1; and this laſt is the Point repreſenting 12, where moſt commonly is a ſmall Braſs Center-pin, being oft in uſe.

Example 2. *Suppoſe the Point repreſenting* 22 *on the Line of Numbers, were requir'd to be found.*

The firſt Figure in the Number 22 being 2, I take the Diviſion at the figure 2 for it; and for the ſecond Figure being 2, I count 2 Tenths onwards; and that is the Point repreſenting 22, at which (in ſome Gunters) is a Braſs Center-pin.

Example 3. *I deſire to know the Point on the Line of Numbers, that doth repreſent* 144.

The firſt Figure being 1, I take the Diviſion at the middle 1 for it; the ſecond Figure being 4, I count 4 Tenths onwards; from thence count 4 Centeſms farther for the third and laſt Figure; this laſt Place is the Point repreſenting 144.

Example 4. *Let it be required to find on the Line of Numbers, the Point repreſenting* 1728.

For the figure 1, take the middle 1; for the ſecond Figure 7, count as before onward 7 Tenths, and that is 700; then for 2, the third Figure, count 2 Centeſms from the laſt, and it repreſents 22, laſtly for the fourth Figure 8, eſtimate 8 Thouſand Parts from the laſt this Point laſt found, repreſenteth 1728.

PROB. II. *To find a Fraction or broken Number, on the Line of Numbers.*

THE Fractions to be found on this Line, ought always to be Decimal; as theſe, 1, 01, 001; 2, 02, 002, &c. that is, $\frac{1}{10}$, $\frac{1}{100}$, $\frac{1}{1000}$; $\frac{2}{10}$, $\frac{2}{100}$, $\frac{2}{1000}$, &c. either of Inches, Feet, Yards, Miles, or the like; alſo in Weight, or Time, or any other Denomition whatſoever.

So that all other Fractions muſt be reduc'd into Decimals, before they can be found on the Line of Numbers; and being ſo reduc'd, they are expreſs'd and found upon this Line; as whole Numbers, by the Rule in Prob. I. and needs no Examples.

PROB. III.

To perform Multiplication by the Line of Numbers.

The Rule is;

AS 1 is to the Multiplicand, ſo is the Multiplier to the Product.

Now to work this, or any Proportion on the *Gunter*, this is,

A General Rule:

1. Extend the Compaſſes from the firſt Term to the ſecond.

2. That Extent in the Compaſſes laid the ſame way from the third Term, will reach to the fourth Term, or Thing requir'd.

By the ſliding Gunter, thus;

1. Set the firſt Term (counted on the ſliding or middle Piece) right againſt the ſecond Term, counted on the fixed Piece.

2. Then ſeek the third Term, always on the ſame the firſt Term was counted on the ſliding Part; and againſt it, on the fixed Part, is the fourth Term or thing requir'd.

Examp. 1. *What is the Product of* 8 *multiplied by* 4?

The Analogy, or Proportion is this;

As 1 is to 8, ſo is 4 to the Product.
Or it is,
As 1 is to 4, ſo is 8 to the Product.

1, *By the Gunter with Compaſſes.*

Extend the Compaſſes from 1 to 8; that Extent ſet from 4 (the ſame way) reacheth to 32 the Product of 8 multiplied by 4.

Or the Extent from 1 to 4, being laid from 8, reacheth to 32, the Product, as before.

2. *By the ſliding Gunter.*

Set 1 (at the beginning on the middle or ſliding-piece) right againſt 8 (on the fix'd or out-ſide piece;) then againſt 4 (on the firſt) is 32, (on the ſecond) the Product requir'd.

Or, ſet 1 (as before) againſt 4, then againſt 8 (on the firſt) is 32 (on the ſecond) the Product, as before.

Examp. 2. *What is the Product of* 16 *multiplied by* 5 ?

The Proportion to work it by, is this:
As 1 is to 5, ſo is 16 to the Product.

1. *By Gunter with Compaſſes thus*;

The Extent from 1 to 5, being laid from 16, reacheth to 80, the Product required.

2. *By the ſliding Gunter.*

Set 1 (on the middle piece) againſt 5 (on the outſide piece) then againſt 16 (on the firſt) is 80 (on the ſecond) the Product requir'd.

PROB. IV. *To perform Diviſion by the Line of Numbers.*

The Rule or Proportion, is this;

AS the Diviſor is to 1, ſo is the Dividend to the Quotient.

Example 1. *If the Dividend be* 64, *and the Diviſor* 4; *what is the Quotient?*

To do this, the Proportion is;
As 4 is to 1, ſo is 64 to the Quotient.

1. *By the Gunter with Compaſſes, thus*;

The Extent from 4 to 1, laid (the ſame was) from 64, reacheth to 16, the Quotient requir'd.

2. *By Sliding Gunter, thus* ;

Set 4 (on the middle Piece) againſt 1 (on the outſide Piece) then againſt *64* (on the firſt) is *16* (on the ſecond) which is the Quotient requir'd.

Example 2. *How often is* 144 *contain'd in* 1728 ?

To do this, the Proportion is this :

As 144 is to 1, ſo is 1728 to the Anſwer.

1. *By Gunter, with Compaſſes, thus* ;

The Extent from 144 to 1, reacheth from 1728 to 12, the Quotient or Anſwer requir'd.

2. *By ſliding Gunter thus* ;

Set 144 (on the middle Piece) againſt 1 (on the outſide Piece) then againſt 1728 (on the firſt) is 12 (on the ſecond) which is the Quotient requir'd.

PROB. V. *To reduce a Vulgar Fraction to a Decimal, by the Line of Numbers.*

To perform this, the Proportion is thus ;

AS the Denomination of the given Fraction is to its Numerator, ſo is 1 to the Decimal Fraction requir'd.

Example, *Suppoſe it be requir'd to reduce* $\frac{3}{4}$ *(a Vulgar Fraction) into a Decimal Fraction* ?

Note,, A Decimal Fraction hath for its Denominator an Unit, with as many Cyphers as its Numerator hath Places: And the Proportion to find its Numerator, is thus ;

As 4 is to 3, ſo is 1 to the Numerator of the Decimal Fraction requir'd,

1. *By Gunter, with Compaſſes thus* ;

The Extent from 4 to 3, reacheth (the ſame way) from 1 to 75, or $\frac{75}{100}$ the Decimal Fraction requir'd.

2. *By Sliding Gunter, thus* ;

Set 4 (on the middle Piece) againſt 3 (on the outſide Piece,) then againſt 1 (on the firſt) is 75, or $\frac{75}{100}$ on the ſecond, the Decimal Fraction requir'd to be found: So that 75, or $\frac{75}{100}$ is equal in Value to $\frac{3}{4}$.

PROB. VI. *Of Continual Proportion, or Geometrical Progreſſion ; which is unto two given Numbers ; to find a 3d, 4th, 5th, &c, Number, in a continued Proportion, by the Line of Numbers.*

The Analogy by which it is effected, is this:

AS the firſt Number given, is to the ſecond, ſo is the ſecond to a third ; and ſo is that third to a fourth ; and ſo is that fourth to a fifth, *&c.*

Example. *Let the two Numbers given be* 2 and 4 ; *unto which it's requir'd to find a* 3*d. a fourth Proportional,* &c.

For the Performance hereof the Rule is thus ;
As 2 is to 4, ſo is 4 to a 3d ; ſo is that 3d to a 4th, *&c.*

1. *By Gunter with Compaſſes, thus* ;

The Extent from 2 to 4 reaches from 4 to 8, the 3d ; and from 8 to 16 the 4th ; and from 16 to 32, the 5th Proportional Number ; and ſo on to as many as you pleaſe. So that 2, 4, 8, 16, 32, *&c.* are Numbers in continued Proportion Geometrical, as was requir'd.

2. *By Sliding Gunter, thus* ;

Set 2 (on the middle Piece) to 4 (on the next ſide Piece,) then againſt 4 (on the firſt) is 8 (on the ſecond) for the 3d Proportional ; and againſt 8 (on the firſt) is 16 (on the ſecond) the 4th Proportional ; and in like manner again, 16 is 32 the 5th Proportional, as was requir'd ; and ſo on for more.

PROB. VII.

Of the Rule of Three Direct, or 3 Numbers given, to find a 4th in direct Proportion, by the Line of Numbers.

The Analogy whereby this is perform'd, is thus ;

AS the firſt Number is to the ſecond, ſo is the third to the fourth Number requir'd.

Example 1. *If the Diameter of a Circle be 7 Inches, and the Circumference thereof 22 ; What is the Circumference of a Circle, whoſe Diameter is 14 Inches ?*

To perſorm this, the Analogy is thus ;
As 7 is to 22, ſo is 14 to the Circumference requir'd.

1. *By Gunter with Compaſſes.*

The Extent from 7 to 22, laid (the ſame way) from 14, will reach to 44, the Circumference of the Circle, whoſe Diameter is 14 ; which was requir'd.

2. *By Sliding Gunter thus ;*

Set 7 (on the middle Piece) againſt 22 (on the outſide Piece) then again 14 (on the firſt) is 22 (on the ſecond) which is the Circumference requir'd.

Example 2. *If the Circumference of a Circle be 3.14, and its Diameter 1 ; What will the Diameter of another Circle be, whoſe Circumference is 44 ?*

The Proportion is,
As 3.14 to 1, ſo is 44 to the Diameter requir'd.

1. *By Gunter with Compaſſes, thus ;*

The Extent from 3.14 to 1, reacheth from 44 to 14, the Diameter requir'd.

2. *By Sliding Gunter, thus;*

Bring 3.14 (on the middle Piece) right againſt 1 (on the outſide Piece) and then againſt 44 (on the firſt) is 14 (or the ſecond) which is the Diameter requir'd.

Note, In the Rule of Three Direct; If the 3d Number be greater than the 1ſt, then will the 4th Number be greater than the 2d. But,

If the 3d Number be leſs than the 1ſt, then the 4th will be leſs than the 2d.

Example 3. *If 30 Acres of Land be worth 25 Pounds a Year; how much a Year will 54 Acres be worth?*

To do this, or any Queſtion in the *Rule of Three*, always in the Proportion, let the firſt and third Numbers or Terms be of one Kind or Denomination: And in this it is.

As 30 Acres is to 25 Pound, ſo is 54 Acres to 45 Pound.

1. *By Gunter, with Compaſſes:*

The Extent from 30 to 25, reacheth from 54 to 45, the Yearly Rent requir'd.

2. *Alſo, By Sliding Gunter.*

Bring 30 againſt 25, then againſt 54 (on the firſt) is 45 (on the ſecond) as before.

By this time the Reader is ſo well acquainted in the way of Working a Proportion on the Line of Numbers, with Compaſſes, or without, that it's a needleſs thing to expreſs it in Words, being ever the ſame: Henceforward you ſhall have only the Proportion ſet down, leaving the manner of its Operation to your Practice, except in caſe where the Working differs from what went before.

PROB.

PROB. VIII.

Of the Rule of Proportion Inverſe, or three Numbers given, to find a fourth in an Inverſe Proportion (or in the backward Rule of Three) by the Line of Numbers.

1. IN this Rule you muſt note, if the 3d Number be greater than the 1ſt, then will the 4th be leſs than the 2d: But,

2. If the 3d be leſs than the 1ſt, the 4th is to be greater than the 2d.

3. And to reſolve Queſtions of the backward Rule of Three, the Proportion is thus;

As the third Number is to the ſecond; ſo is the firſt to the fourth.

Example. *If* 72 *Pioneers make a Trench in* 48 *Hours; in how long time can* 54 *Pioneers make it?*

By the Directions above, this is the Proportion;

As 54 Men is to 48 hours, ſo is 72 Men to 64 hours; the Anſwer to the Queſtion: From whence you may conclude, That 54 Men will perform as much in 64 hours, as 72 Men in 48 hours.

PROB. IX.

Of Duplicate Proportions or 3 Numbers given, to find a 4th in a Duplicate Proportion, by the Line of Numbers.

THIS Rule is chiefly us'd in Proportion of Lines to Superficies, &c. Wherein the firſt and ſecond Term are to be of one Kind or Denomination.

Example 1. *If the Diameter of a Circle be* 1, *and its Area or Content* 0.78539: *What's the Content of a Circle, whoſe Diameter is* 14?

To perform this, the firſt and ſecond Terms by the Note above are to be Lines; that is, the Diameters given; and then the Proportion is thus:

As 1 is to 14, ſo is 0. 785 to a 4th; and ſo is that 4th to the Content requir'd.

1. *By Gunter with Compaſſes.*

The extent from 1 to 14, reacheth from 0.785 to 11; and the ſame Extent laid the ſame way from 11, reacheth to 154, the Content requir'd.

2. *By the ſliding Gunter.*

Bring 1 on the middle Piece right againſt 14 on the outſide Piece, then againſt 0.785 (on the firſt) is 11 on the ſecond, and againſt 11 on the firſt is 154 on the ſecond, the Content requir'd.

Example 2. *If the Diameter of a Circle be 7, and its Area 38.5 What is the Area of a Circle, whoſe Diameter is 12?* Anſwer 112.

For, as 7 is to 12, ſo is 38.5 to *66*; and ſo is *66* to 112.

Examp. 3. *If the Diameter of a Circle be 1, and its Area 0.78539; VVhat is the Diameter of a Circle, whoſe Area is 154?* Anſwer 14.

In this the Proportion is of Superfices to Lines, which is thus;

As Area 0.785 is to Area 154, ſo is Square of Diameter 1, to Square of Diameter requir'd.

1. *By Gunter with Compaſſes.*

The Extent from 0.785 to 154, reacheth from 1 to 196, the Square of the Diameter requir'd.

Then divide the ſpace between 1 always the middle 1, if the number of Places be odd; but if even, the firſt 1) and 196, into two equal Parts the Foot in the middle reſteth at 14, the Diameter of the Circle, whoſe Area is 154.

2. *By the ſliding Gunter.*

Bring 0.785 againſt 154, and againſt 1 on the firſt is 196 (on the ſecond;) then find the middle between 1 and 196, which is at 14, the Diameter as before.

Example 4. *The Diamter of a Circle being* 1, *and its Area* 0.785; *What is the Diameter of a Circle, whoſe Area is* 112? Anſwer 12.

For as 0.785 is to 112, ſo is 1 to 144; the middle between it and 1, is at 12, the Diameter requir'd.

PROB. X.

Of Triplicate Proportion, or 3 *Numbers given; to find a* 4*th in a Triplicate Proportion, by the Line of Numbers.*

THIS Problem concerneth the Proportion of Lines to Solids, and the contrary; in which evermore make the firſt and ſecond Term to be of one Denomination.

Examp. 1. *If an Iron Bullet weigh* 9 *Pounds, and its Diameter is* 14 *Inches; What is the Weight of another Iron Bullet, whoſe Diameter is* 6 *Inches?*

To perform this, the firſt and ſecond Terms are to be Lines; that is, the given Diameters, and then the Proportion is thus;

As 4 is to 6, ſo is 9 to 13.5; and ſo is 13.5 to 20.2, ſo is 20.2 to 30.3, that is, 30 Pounds three Tenths of a Pound; which is the Weight required.

1. That is, *By Gunter with Compaſſes*

The Extent from 4 to 6, being laid 3 times from 9, will reach to 30 Pounds 3 Tenths, the Weight requir'd

2. And, *By ſliding Gunter, thus*;

Set 4 againſt 6, and againſt 9 on the firſt is 13.5 on the ſecond; then againſt 13.5 on the firſt is 20.2 on the ſecond; and againſt 20.2 on the firſt is 30.3 on the ſecond; that is 30 Pounds 3 Tenths, as before.

Example 2. *If an Iron Bullet* 1 *Inch Diameter weigh Pound* 0.1406 *Parts*; *What is the Weight of another, whoſe Diameter is* 4 *Inches, it being of the ſame Metal*? Anſwer, 9 *Pound*. For,

As 1 is to 4, ſo is 0.1406 to 0.563; and ſo is 0.563 to 2.25; and ſo is 2.25 to 9 Pounds, the Weight required.

Example 3. *If a Gun* 6 *Inches Bore require* 11 *Pound of Powder*; *How much will ſerve a Gun* 4 *Inches Bore*? Anſwer, *Pounds* 3,25 *parts.* For,

As 6 to 4, ſo is 11 to 7.3; and ſo is 7.3 to 4.88; and ſo is 4.88 to 3.25; which is Pounds; 3.25 parts of a Pound, or Pounds $3\frac{1}{4}$.

Example 4. *If an Iron Bullet* 1 *Inch Diameter weigh Pound* 0.1406 *parts*; *What Diameter ſhall that be which weigheth* 9 *Pound of the ſame Metal*? Anſwer, 4 *Inches* For,

As 0.1406 is to 9, ſo is 1 to 64, the Cube of the Diameter requir'd; then divide the ſpace between 1 and 64 into 3 equal Parts, and the Foot in the firſt $\frac{1}{3}$ part from 1 reacheth to 4, the Diameter of the Iron Shot weighing 9 Pounds.

II. *The Uſe of the Line of Numbers (commonly called* Gunter's Line) *in Meaſuring Superficies, as Board, Glaſs, Land,* &c. *and Solids, as Timber, Stone, Gauging,* &c.

PROB. I.

The Length and Breadth of any Square, or long Square, Superficies given; to find the Area or Content thereof.

The Proportion is this;

AS 1 is to the Breadth, ſo is the Length to the Content.

Example 1. *A plain Superficies, as a Board or Plank be given to be meaſur'd; the Breadth thereof is* 15 *Inches, and its Length* 61 *Inches; What is the Content of it?* Anſwer, 915 *Inches.* For,

As 1 to 15, ſo is 61 to 915 Inches, the Content requir'd.

Note, Such as the Breadth and Length is, ſuch is the Content; ſo that if the Breadth and Length be Feet, the Content is Feet; if Perches, then Perches, *&c.*

Example 2. *A Piece of Wainſcot, in Form of a long Square, whoſe Length is Feet* 15.5 *Parts, and Breadth Feet* 2.25 *Parts; What is the Content?* Anſwer, *Feet* 34.86 *Parts.* For,

As 1 is to 2.25, ſo is 15.5 to 34.86, the Content requir'd.

PROB. II. *The Breadth and Length of a Superficies given in one kind of Meaſure; to find the Content thereof in another kind of Meaſure.*

To do this, the Proportion is thus:

AS the other kind of Meaſure is to the Breadth, ſo is the Length to the Content.

Example 1. *A Plank or Board* 15 *Inches broad,* 61 *Inches long; I demand the Content of it in Feet?* Anſwer, *Feet* 6.35 *parts.*

In a Foot ſuperficial, or a Square Foot, is 144 ſquare Inches, and therefore the Proportion is thus:

As 144 is to 15 Inches, ſo is 61 Inches to Feet 6.35 Parts of a Foot.

Examp. 2. *A Piece af Land, in form a long ſquare, whoſe Breadth being* 30 *perches, Length* 183 *perches; What is the Content in Acres?* Anſwer 34.35 *parts.*

For 160 Perches is an Acre, and the Proportion is thus;

As 160 is to 30 Perches, ſo is 183 Perches to Acres 34.35 parts of an Acre.

Examp. 3. *A piece of Painting, in form a long Square, whoſe Breadth, Feet* 3.5, *and Length* 21 *Feet; How many ſquare Yards is the Content?* Anſwer, *Yards* 8.16 *parts.*

For 9 Feet being a Yard ſquare, the Proportiion is thus;

As 9 is to 3.5 Feet, ſo is 21 Feet to Yards 8.16 parts.

PROB. III. *The Breadth of a Superficies given in one kind of Meaſure, and the Length in another, to find the Content in the greater Meaſure.*

To do this, the Proportion is thus.

AS the greater Meaſure is to the Breadth, ſo is the Length to the Content requir'd.

Example 1. *Admit a a Board* 10 *Inches broad, and* 20 *Feet long; I demand the Content in Feet?* Anſwer, *Feet* 16.6 *Tenths of a Foot.*

For the Proportion is thus;

As 12 is to 10 Inches, ſo is 20 Feet to Feet 16.6 Tenths.

Examp

Example 2. *If a Board or Plank be* 15 *Inches broad, and* 27 *Feet long; What is the Content of it in Feet?* Anſwer, *Feet* 33.75 *parts of a Foot, or* $33\frac{3}{4}$ *Feet.* For it is,

As 12 is to 15 Inches, ſo is 27 Feet to Feet 33.75 parts.

Example 3. *A Board* $7\frac{1}{2}$ *Inches broad, and* $29\frac{1}{4}$ *Feet long; What's the Content in Feet?* Anſwer, *Feet* 18.4 *Tenths.* For it is,

As 12 is to 7.5, ſo is 29.25 to Feet 18.4 Tenths.

Example 4. *A Piece of Land (in form a long ſquare) whoſe Breadth is* 30 *Perches, and Length is Chains* 15.25 *Links (meaſured by a Chain of* 4 *Perches in* 100 *Links; I demand the Content thereof in Acres?* Anſwer, *Acres* 11.4 *Tenths.* For it is,

As 40 is to 30 Perches, ſo is Chains 15.25 to Acres 11.4 Tenths of an Acre.

PROB. IV. *The Breadth of a Superficies given; to find how much in Length will make a Foot, a Yard, a Perch, or an Acre,* &c.

To do this, take this General Rule.

As the Breadth is to a Foot, (a Yard, *&c.*) ſo is a Foot, (a Yard, *&c.*) to the Length, which will make a Foot (a Yard, *&c.*)

Example 1. *If a Board be* $7\frac{1}{2}$ *Inches broad; How much in Length will make a Foot ſquare;* Anſwer, *Inches* 19.2 *Tenths of an Inch.*

For the Proportion is thus;

As 7.5 is to 12, ſo is 12 to Inches 10.2 Tenths.

Example 2. *A Plank* 30 *Inches broad; How much in Length will make a Foot?* Anſw. *Inches* 4.8 *tenths of an Inch.* For it is,

As 30 Inches is to 12, ſo is 12 to Inches 4.8 Tenths.

Example 2. *A Pane of Glaſs being in Breadth, Feet* 2.5 *tenths; How much in Length will make a Foot?* Anſwer, 4 *Tenths of a Foot.* For it is thus;

As 2.5 is to 1 Foot, ſo is 1 Foot to 0.4 Tenths of a Foot.

Example 4. *A Piece of Matting being 27 Inches broad; How much in Length will make a Yard ſquare?* Anſwer 48 *Inches or* 4 *Feet.* For it is thus;

As 27 Inches is to 36 Inches, ſo is 36 Inches to 48 Inches: But if the Breadth be given in Feet; that is, for 27 Inches, it be 2 $\frac{1}{4}$ Feet, or 2.25 Feet: Then it is thus;

As 2.25 is to 3 Feet ſo is 3 Feet to 4 Feet in Length, to make a Yard ſquare.

PROB. V. *The Diameter of a Circle given, to find the Circumference.*

The Analogy or Proportion, is thus;

As 1 is to 3.142, ſo is the Diameter to its Circumference.

Example. *If the Diameter of a Circle be* 15 *Inches; What is the Circumference of it?* Anſwer, *Inches* 47.12 *parts.* For,

As 1 is to 3.142, ſo is 15 Inches to Inches 47.12 parts.

PROB. VI. *The Circumference of a Circle given, to find its Diameter.*

The Proportion ſtands thus;

As 3.142 is to 1, ſo is the Circumference to its Diameter.

Example. *The Circumference of a Circle being* 44 *Feet, What is the Diameter thereof?* Anſwer *Feet* 14. For it is,

As 3.142 is to 1, ſo is 44 Feet to Feet 14.

PROB. VII. *The Diameter of a Circle being given; to find its ſuperficial Content.*

The Analogy is thus;

As 1 is to the Diameter, ſo is 0.7854, to a 4th Number, and ſo is that 4th to the Superficial Content requir'd.

Examp. *The Diameter of a Circle being* 15 *Inches, What is the Content of it?* Anſw. *Inches* 176.7 *tenths.* For it is, As 1 is to 15, ſo is 0.7854 to 11.78; and ſo is 11.78 to 176.7 the Superficial Content requir'd.

PROB. VIII. *The Circumference of a Circle being given, to find the Superficial Content of it.*

The Proportion is this;

As 1 is to the Circumference, ſo is 0.07958 to a 4th and ſo is that 4th to the Superficial Content requir'd.

Example. *If the Circumference of a Circle be* 44 *Inches; What's the Content?* Anſwer, *Inches* 154.06 *parts of an Inch.* For it is,

As 1 to 44, ſo is 0.07958 to 3.5; and ſo is 3.5 to 154.06.

III. *The Uſe of the Line of Numbers in Solid Meaſure, ſuch as Timber, Stone, Gauging,* &c.

PROB. I. *The Side of a ſquare Solid given in Inches, to find how much in Length will make a Foot ſolid.*

The Proportion, is thus;

As the given Side is to 12, ſo is 12 to a 4th Number; and ſo is that 4th Number to the Length requir'd to make a Foot ſolid.

Example 1. *A ſquare piece of Timber or Stone, whoſe Breadth and Depth, each* 8 *Inches; How much in Length will make a Foot Solid?* Anſwer, 27 *Inches or* 2 *Feet* 3 *Inch.* For it is,

As 8 is to 12, ſo is 12 to 18; and ſo is 18 to 27 Inches.

Example 2. *A ſquare Piece of Timber or Stone, whoſe ſides is* 2 *Feet or* 24 *Inches: How much in Lenth will make a Foot?* Anſwer, 3 *Inches.* For it is,

As 24 is to 12, ſo is 12 to 6; and ſo is 6 to 3 Inches

PROB. II. *The Side of a ſquare Solid given in Foot meaſure (which is the Decimal Foot, or a Foot divided into* 100 *equal Parts;) to find how in Length will make a Foot Solid.*

The Proportion is thus;

AS the given Side is to 1, ſo is 1 to a 4th Number; and ſo is that 4th Number to the Length required to make a Foot Solid.

Example. *A ſquare Piece of Timber, whoſe Side is Feet* 1.52 *parts; How much in Length will make a Foot Solid?* Anwer, 0.438 *parts of a Foot.* For it is,

As 1.52 is to 1, ſo is 1 to 0.664; and ſo is 0.664 to 0.438 parts of a Foot.

PROB. III. *The Breadth and Depth of a Solid, whoſe two Ends are equal long Squares, being given in Inches, or Foot-meaſure; to find how much in Length will make a Foot Solid.*

1. *The Proportion for Inches, is thus;*

AS 12 is to the Breadth, ſo is Depth to a 4th Number: Then,

As that 4th Number is to 12, ſo is 12 to the Length in Inches to make a Foot Solid.

2. *The Proportion for Foot-meaſure, is thus;*

As 1 is to the Breadth, ſo is the Depth to a 4th Number: Then,

As that 4th Number is to 1, ſo is 1 to the Length in Foot-meaſure to make a Foot Solid.

Example 1. *A Piece of Timber or Stone, whoſe Breadth is* 11 *Inches, and Depth* 19 *Inches; How much in Length will make a Foot?* Anſwer, *Inches* 8.26 *parts.* For it is,

As 12 is to 11, ſo is 19 to 17.5: And then ſay,

As 17.5 is to 12, ſo is 12 to Inches 8.26 parts in Length to make a Foot Solid.

Example 2. *A Piece of Timber, in Breadth Foot* 0.75 *parts, and Depth Foot* 1.25 *parts; How much in Length will make a Foot Solid?* Anſwer, *Foot* 1.06 *parts*. For it is,

As 1 is to 0.75, ſo is 1.25 to 0.94: Then ſay,

As 0.94 is to 1, ſo is 1 to Foot 1.06 parts in Length to make a Foot.

PROB. IV. *The Side of a ſquare Solid, and its Length being given; to find the Content.*

1. WHen the Side is given in Inches, and Length in Feet, the Proportion is thus;

As 12 is to the given Side, ſo is the Length to a 4th Number; and ſo is that 4th Number to the Content in Feet.

2. When the Side and Length are both given in Foot-meaſure, the Proportion is thus;

As 1 is to the given Side, ſo is the Length to a 4th Number; and ſo is that 4th Number to the Content requir'd.

Example 1. *A ſquare Piece of Timber, whoſe Side is* 9 *Inches, and Length* 35 *Feet; How many Feet of Timber is in it?* Anſwer, *Feet* 19.85 *parts.* For it is,

As 12 is to 9, ſo is 35 to 26.4; and ſo is 26.4 to Feet 19.85 parts

Example 2. *A Piece of Timber* 16 *Inches ſquare, and* 28 *Feet long; How much is the Content?* Anſwer, 50 *Feet.* For it is,

As 12 to 16, ſo is 28 to 37.4; and ſo is 37.4 to 50 Feet

Examp. 3. *A Stone, Feet* 2.75 *parts ſquare, and Feet* 7.50 *parts long; How much is the Content?* Anſwer, *Feet* 36.52 *parts.* For it is,

As 1 to 2.75, ſo is 7.50 to 20.6; and ſo is 20.6 to Feet 36.52 parts

PROB. V.

The Length, Breadth, and Depth of a Square Solid being given to find the Solid Content.

1. IF the Breadth and Depth be given in Inches, and the Length in Feet, the Proportion is thus;

As 12 is to the Breadth, ſo is the Depth to a 4th Number: Then ſay,

As 12 is to that 4th Number, ſo is the Length in Feet to the Content in Feet.

2. When the Length, Breadth, and Depth are all given in Foot-meaſure, then the Proportion is thus;

As 1 is to the Breadth, ſo is the Depth to a 4th Number: And then again ſay,

As 1 is to that 4th Number, ſo is the Length to the Content in Feet.

Examp. 1. *If a Square Piece of Timber be in Breadth* 19 *Inches, Depth* 11 *Inches, and* 20 *Feet long; How much is the Solid Content?* Anſw. *Feet* 29·03 *Parts.* For it is thus;

As 12 to 19, ſo is 11 to 17.4: Then ſay,

As 12 to 17.4, ſo is 20 to Feet 29.3 Parts, the Content requir'd.

Example 2. *A Stone* 20 *Inches broad,* 13 *Inches deep, and Feet* 15.25 *or* $15\frac{1}{4}$ *Feet: How much is the Content?* Anſwer, *Feet* 27.5 or $27\frac{1}{2}$ *Feet.* For it is,

As 12 to 20, ſo is 13 to 21.67: And then,

As 12 to 21.67, ſo is 15.25 to 27.5; that is $27\frac{1}{2}$ Feet.

Example. 3. *A ſquar'd Piece of Timber, Feet* 1.25 *broad, Feet* 0.56 *deep, and* 36 *Feet long; How much is the Content?* Anſwer, *Feet* 25.20 *Parts, or* $25\frac{2}{10}$ *Feet.* For it is,

As 1 is to 1.25, ſo is 0.56 to 0.70: And then,

As 1 is to 0.70, ſo is 36 to Feet 25.2 Tenths.

PROB. VI.

The Diameter of a Cylinder given, to find how much in Length will make a Foot-ſolid.

1. IF the Diameter be given in Inches, the Proportion is thus;

As the given Diameter is to 13.531, ſo is 12 to a 4th Number; and ſo is that 4th Number to the Length requir'd to make a Foot ſolid.

2. When the Diameter is given in Foot-meaſure, the Proportion is thus;

As the given Diameter is to 1.128, ſo is 1 to a 4th Number; and ſo is that 4th Number to the Length, which will make a Foot-ſolid.

Examp. *A round Piece of Timber, or Stone, being* 15 *Inches Diameter; How much in Length will make a Foot-ſolid?* Anſwer, *Inches* 9.78 *parts of an Inch.* For it is,

As 15 is to 13.531, ſo is 12 to 10.75; and ſo is 10.75 to Inches 9.78 parts, or $9\frac{78}{100}$ Inches.

But ſuppoſing the Diameter of the ſame to be taken in Foot-meaſure; then its Foot 1.25 Parts; Now how much will make a Foot? Anſwer, Foot 0.82 parts of a Foot. For it is thus

As 1.25 is to 1.128, ſo is 1 to 0.905; and ſo is 0.905 to Foot 0.815 Parts, or $\frac{815}{1000}$ Foot.

PROB. VII.

The Circumference of a Cylinder given; to find how much in Length will make a Foot ſolid?

1. WHEN the Circumference is given in Inches, the Proportion is;

As the Circumference is to 42.54, ſo is 12 to a 4th Number; and ſo is that 4th Number to the Length requir'd to make a Foot-ſolid.

2. But if the Circumference be given in Foot-meaſure, then the Proportion is;

As the Circumference is to 3.545, ſo is 1 to a 4th Number; and ſo is that 4th Number to the Length, to make a Foot-ſolid.

Examp. *If a round Stone, or Tree, be* 44 *Inches about; How much in Length will make a Foot?* Anſwer, *Inches* 11.22 *Parts.* For it is, As 44 to 42.54, ſo is 12 to 11.52; and ſo is 11.52 to Inches 11.22 parts of an Inch, or 11$\frac{22}{100}$ Inches.

But ſuppoſe the ſame was meaſured by Foot-meaſure, and the Circumference found to be Feet 3.67 parts; How much in Length will make a Foot? *Anſwer*, Foot 0.935 parts. For it is thus;

As 3.67 is to 3.545, ſo is 1 to 0.967; and ſo is 0.967 to Foot 0.935 parts or $\frac{935}{1000}$ Foot.

PROB. VIII. *The Diameter and Length of a Cylinder given; to find its ſolid Content.*

1. WHEN the Diameter is given in Inches, and Length in Feet, the Proportion is thus,

As 13.531 is to the Diameter, ſo is the Length to a 4th Number; and ſo is that 4th Number to the ſolid Content in Feet.

2. If the Diameter and Length are both given in Foot-meaſure, then the Proportion is thus;

As 1.128 is to the Diameter, ſo is the Length to a 4th Number; and ſo is that 4th Number to the Content required.

Example, *A round Piece of Timber* 10 *Inches through, and* 30 *Feet long; How many Feet of Timber is in it?* Anſwer, *Feet* 16.35 *parts*. For it is.

As 13.531 to 10, ſo is 30 to 22.18; and ſo is 22.18 to Feet 16.35 parts of a Foot, or 16$\frac{35}{100}$ Feet.

But ſuppoſe the ſame Piece meaſur'd by Foot-meaſure, then it's Foot 0.83, parts thro': And the Work is thus;

As 1.128 to 0.83, ſo is 30 to 22.18; and ſo is 22.18 to Feet 16. 35 parts,, or 16$\frac{35}{100}$ Feet, as before.

PROB. IX. *The Circumference and Length of a Cylinder given; to find the Solid Content.*

1. IF the Circumference be given in Inches, and Length in Feet, the Proportion is thus;

As 42.54 is to the Circumference, ſo is the Length to a 4th Number; and ſo is this 4th Number to the ſolid Content in Feet.

2. When the Circumference and Length are both in Foot-meaſure, the firſt Term being 3.545, (inſtead of 42.54) the former Words will ſerve here.

Example. *A round Stone or Tree, being* 30 *Inches about, and* 25 *Feet long; How many Feet ſolid are in it?* Anſwer, *Feet* 12.5 *parts*. For it is thus;

As 42.54 is to 30, ſo is 25 to 17.62; and ſo is 17.62 to Feet 12. 52 parts, or $12\frac{52}{100}$ Feet.

Now the Compaſs about being taken in Foot-meaſure, its Feet 2.50 parts, and the Proportion is;

As 3.545 to 2.50, ſo is 25 to 17.62; and ſo is 17.62 to Feet 12.53 parts, or $12\frac{53}{100}$ Feet, as before.

Note, 1. When Timber tapers, that is, is bigger at one end than at t'other, it's uſual to take the Breadth and Depth in the middle of its Length; and by them to meaſure the Piece as if it were both ends of a bigneſs.

Note, 2. The Proportions for Foot-meaſure, are the ſame, when all the Dimenſions are taken in Inches; only then the ſolid Content found is Inches.

Note, 3. The ſolid Content in Inches, divided by 1728, the Quotient is Feet; but if divided by 282, or 231, the firſt is Beer, and the latter is Wine-Gallons: And how to divide by the *Line of Numbers* was ſhew'd in *Prob.* 4. of the firſt Uſes of the *Gunter*.

PROB. X. *The Diameter of a Cask at Head and Bung, and alſo its Length given in Inches; to find its Content in Gallons, Beer or Wine.*

The Rule is thus;

1. AS 1 is to 0.7 ſo is the Difference of Bung and Head-Diameters to a 4th Number; which being added to the Head-Diameter, the Sum is the Mean-Diameter, reducing the Cask to a Cylinder. Then ſay,

2. A

2. As the Gauge-point (which for Beer or Ale is 18.95 but for Wine 17.15) is to the mean Diameter, ſo is the Length to a 4th Number; and ſo is this 4th Number to the Content in Gallons requir'd.

Examp. *Suppoſe a Cask whoſe Length is* ——40

$$\left.\begin{array}{l}\textit{Suppose a Cask whose Length is} \text{ ——— } 40\\ \textit{Diameter at} \text{ ——————— } \left\{\begin{array}{l}\textit{Bung } 28\\ \textit{Head } 20\end{array}\right.\end{array}\right\}\textit{Inches:}$$

What's the Content of this Cask in Gallons, Beer or Wine? Anſwer, 73 *Gallons Beer, and Wine Gallons* 89.2 *Tenths.* See the Work following:

Bung Diameter ———————— 28 Inches.
Head Diameter ———————— 20
Their Difference is ———————— 8 Inches.

Then, As 1 to 0.7, ſo is 8 to 5.6; which added to 20, the *Head-Diameter*, makes 25.6 for the *Mean Diameter*; Then ſay,

$$\text{As}\left\{\begin{array}{l}18.95\\17.15\end{array}\right\}\text{is to } 25.6\text{, ſo is } 40 \text{ to}\left\{\begin{array}{l}54.\\59.76\end{array}\right\}\text{and ſo is}$$

$$\left\{\begin{array}{l}54.\\59.76\end{array}\right\}\text{to}\left\{\begin{array}{ll}73. & \textit{Beer}\\89.2 & \textit{Wine}\end{array}\right\}\textit{Gallons.}$$

1. *By Gunter, with Compaſſes.*

1. The Extent from 1 to 0.7, will reach the ſame way from 8 to 5.6; which being added to 20 (the *Head Diameter*) makes 25.6 for the *Mean Diameter.* Then,

2. The Extent from 18.95 (the *Gauge-point for Beer*) to 25.6, will reach from 40 to 54, and that Extent turn'd over again, reacheth to 73, the Content in Beer Gallons.

In like manner, the Extent from 17.15, the *Gauge-Point for Wine*, to 25.6, being laid twice from 40, will reach to 89.2, the Wine-Gallons.

2. *By the Sliding Gunter.*

1. Set 1 againſt 0.7 and againſt 8 on the firſt, is 5.6 on the ſecond; which added to 20, the Head-Diameter, makes 25.6 for the *Mean Diameter.* Then,

2. Set 18.95 (the *Gauge-Point for Beer*) on the firſt againſt 25.6 on the ſecond; then againſt 54 on the firſt is 73 on the ſecond, the Content in *Beer-Gallons*.

Alſo, if you ſet the *Gauge-Point for Wine* 17.15, againſt the *Mean Diameter* 25.6; then againſt the *Length of the Cask* 40 on the firſt, on the ſecond you will find 59.76; and againſt 59.76 on the firſt, you'll find on the ſecond 89.2, the Content in *Wine-Gallons*.

PROB. XI. *The Length of a Ships Keel, and breadth at the Beam given; to find her Tunnage.*

IT's the Practice of the Ship-Wrights about *London*, to multiply the Length of the Keel, Breadth, and half-breadth into one another; and to divide the laſt Product by 94, whoſe Quotient they count for the Ship's Tunnage; from whence I frame this Proportion following, to be wrought by the Line of Numbers.

1. As 188 is to the breadth, ſo is the breadth to a 4th Number: Then ſay,

2. As 1 is to that 4th Mumber, ſo is the Length to the Tunnage requir'd.

Example *Suppoſe a Ship* 72 *Feet by the Keel, and* 24 *Feet by the Beam; I demand her Tunnage?* Anſwer, *Tunns* 220.6 *Tenths neareſt.* See the Work:

As 188 to 24, ſo is 24 to 3.06: And then,
As 1 is to 3.06, ſo is 72 to Tuns 220.6 Tenths.

That is by the *Gunter with Compaſſes.*

1. The Extent from the Given Number 188 to the *Breadth of the Beam* 24: will reach from the ſaid *Breadth* 24 to 3.06. Then,

2. The Extent from 1 to 3.06, will reach from the *Length of the Keel* 72, to Tuns 220.6 Tenths, the Tunnage requir'd.

Or more briefly thus;

The Extent from 13.71, (which is the *Square-Root* of the *Given Number* 188) to the *Breadth of the Beam* 24, being turn'd over twice from the *Length of the Keel* 72, reacheth to Tuns 220.6 Tenths as before.

2. By the ſliding Gunter.

1. Set the *Given Number* 188 againſt the *Breadth of the Ship* 24, and againſt the ſaid Breadth 24 on the firſt is 3.06, on the ſecond. Then,

2. Set 1 againſt 3.06, and againſt the *Length of the Keel* 72 on the firſt, is Tuns 220.6 Tenths on the ſecond as before.

PROB XII. *To find the Tunnage of a Box, Bail, or Caſe, having its Length, Breadth, and Depth given.*

The Rule is thus;

1. As 66 is to the Breadth, ſo is the Depth to a 4th Number: Then,

2. As 1 is to this 4th Number, ſo the Length to its Tunnage requir'd.

Examp. *A Caſe, or Bail, being* 6 *Feet broad,* 4 *Feet deep, and* 10 *Feet long; I demand its Tunnage?* Anſwer 3.63 *parts.* For it is,

As 66 is to 6, ſo is 4 to 0.363: And then,
As 1 is to 0.363. ſo is 10 to Tuns 3.63 parts.

1. By Gunter's Scale with Compaſſes.

1. The Extent from the *Given Number* 66 to the Breadth 6, reacheth from the Depth 4 to 0.363. Then,

2. The Extent from 1 to the laſt *found Number* 0.363 being laid from the Length 10, reacheth to 3.63; that is, 3 Tun and 63 parts of 100, or $3\frac{63}{100}$

2. By the ſliding Gunter thus;

1. Set the *Given Number* 66 againſt the *Breadth* of the Bale or Caſe 6, then againſt the *Depth* of it 4 on the 1ſt,

you will find 0.363 on the ſecond, a 4th *Proportional Number*. Then,

2. Set 1 againſt the ſaid *Proportional Number* 0.363, then againſt the Length of the Bale or Caſe 10 on the firſt, you will find on the ſecond 3.63, or $3\frac{63}{100}$, the Tunnage of the Bale or Caſe propoſed.

Note, That 66 Feet is the Content of a Caſe that will incloſe 2 Engliſh Butts, but the Cantlings of them being better than $\frac{1}{3}$ part; therefore allowing 26 Feet for the Cantlings, the remaining 40 Feet is counted 1 Tun, and then the Rule is;

1. *By Gunter with Compaſſes for the foreſaid* Example.
As 40 is to 6, ſo is 4 to 0.6 And then,
As 1 is to 0.6, ſo is 10 to 6 Tuns, the Content of the Caſe, or Bale required.

2. *By the ſliding Gunter, thus;*

1. Set (the given Number) 40 againſt the Breadth of the Bale or Caſe 6; then againſt the Depth of it 4, on the firſt, you will find 0.6 on the ſecond, a 4th *Proportional Number*. Then,

2. Set 1 againſt the ſaid *Proportional Number* 0.6; then againſt the Length of the Bale or Caſe 10 on the firſt, you will find on the ſecond 6, the Tunnage of the Bale or Caſe propos'd.

PROB. XIII. *The Diameter of a Globe given; to find its ſolid Content.*

The Rule.

AS 1 is to the Diameter, ſo is 0.5236 to a 4th Number; and ſo is that 4th to a 5th; and ſo is this 5th to its ſolid Content requir'd.

Example. *A Globe whoſe Diameter is* 8 *Inches; What's the ſolid Content?* Anſwer, *Inches* 268. For it is wrought thus;

As 1 to 8, ſo is 0.5236 to 4.19 ; and ſo is 4.19 to 33.5 ; and ſo is 33.5 to 268 Inches.

IV. *The Uſe of the Line of Numbers in Gunnery.*

PROB. I. *The Diameter and Weight of any piece of Ordnance known ; to find the Weight of any other being of the ſame Metal and Shape, its Diameter being known.*

Like Solids are in Proportion, as the Cubes of their agreeing Sides ; therefore,

The Rule is thus ;

AS the Diameter of the known Gun is to the Diameter of the Gun whoſe Weight is requir'd ; ſo is the Weight of the known Gun to a 4th Number ; and ſo is that 4th to a 5th, and ſo is that 5th to the Weight requir'd.

Example. *Suppoſe a Braſs Saker, whoſe Diameter is Inches* 11.5 *Tenths, do weigh* 1900 *pounds ; what will a Braſs Gun weigh, whoſe Diameter is Inches* 8.75 *parts?* Anſwer, 840 *pounds.* For it is,

As 11.5 is to 8.75. ſo is 1900 to 1440 ; and ſo is 1440 to 1110 ; and ſo is 1110 to 840 Pounds.

1. That is, *By Gunter's Scale with Compaſſes.*

The Extent from the Diameter 11.5 to the Diameter 8.75, being laid three times from the Weight 1900, will reach to 840 Pounds, the Weight of the Gun requir'd. And,

2. *By the Sliding Gunter, thus ;*

Set the Diameter 11.5. againſt the Diameter 8.75, then againſt the Weight 1900 on the firſt, is 1440 on the ſecond ; and againſt 1440 on the firſt, is 1110 on the ſecond : Alſo againſt 1110 on the firſt, is 840 Pounds, the Weight requir'd.

PROB. II. *Having the Diameter and Weight of one Piece of Ordnance, and the Diameter of another Piece of another Metal; to find the Weight of the laſt, it being of the ſame Shape with the former.*

The Rule is thus;

1. FInd the Weight of the Piece, as if it had been of the ſame Metal the propounded Piece is, by the laſt Problem. Then,

2. Conſider the Proportions of Metals; which are theſe, according to the beſt Authors.

Braſs	is to	*Iron*	As	9	is to	8.
Lead		*Iron*		3		2.
Lead		*Stone*		4		1.
Iron		*Stone*		8		3.

3. Having the Weights of both Pieces in one ſort of Metal, you muſt then proportion their Weight according to their different Metals, by the proportional Numbers of thoſe Metals; and then it's done.

Examp. *If a Braſs Saker of Inches* 11.5 *tenths, weigh* 1900, *What will an Iron Gun, of the ſame Shape weigh, whoſe Diameter is Inches* 8.75 *parts?* Anſwer, 746 *Pound.* For it is wrought thus;

1. I find by *Prob.* 1. that a Braſs Piece, of Inches 8.75 will weigh 840 Pounds; but becauſe this Piece is Iron, and the Proportion of Braſs to Iron (as aboveſaid) is as 9 to 8: therefore ſay,

2. As 9 is to 8, ſo is 840 to 746 Pounds.

PROB. III. *By knowing the Allowance of Powder for one Gun; to find how much of the ſame Powder is requiſite for another Gun.*

The Rule.

AS the Diameter of the Bore of the Gun whoſe Allowance is known, is to the Diameter whoſe Allowance is requir'd ; ſo is the Allowance given to a 4th Number ; and ſo is that 4th to a 5th, and ſo is this 5th to the Allowace requir'd.

But *Note*, Here it is underſtood, that both Guns are alike fortify'd : that is, they ſhould have the ſame Proportion in Weight, and Thickneſs of Metal.

Example. *If a Saker of Inches* [illegible] *Tenths Bore, require a Pound of Powder ; What will a Demi-Cannon of Inches 6.5 Tenths Bore require?* Anſwer, *Pounds*, 25.58 *parts*. For as it is,

As 3.5 is to 6.5, ſo is 4 to 7.44 ; and ſo is 7.44 to 13.82 ; and ſo is 13.82 to Pounds 25.58 parts, the Weight of Powder for the Demi-Cannon in Proportion to the given Saker. But ſuppoſe the Weight of the Saker 1600 ; and the Weight of the Demi-Cannon 6000 ; What Allowance of Powder muſt it then have ?

1. By *Prob.* 1. find the Weight of the Demi-Cannon in Proportion to the Saker's Weight : Which is thus ;

As 3.5 to 6.5, ſo is 1600 to 2960 ; and ſo is 2960 to 5500 ; and ſo is 5500 to 10020 Pounds, the Weight of the Demi-Cannon requiring Pounds 2.558 parts of Powder for its Loading. But ſeeing its Weight is ſuppos'd to be 6000 ; ſay,

2. As 10020 is to 6000, ſo is 25.58 to Pounds 15, the due Allowance of Powder for the Demi-Cannon of Inches 6.5 tenths Bore, and weighing 6000 Pounds ; at the rate a Saker Inches 3.5 tenths Bore, weighing 1600 Pounds, doth require 4 Pounds of Powder.

PROB. IV. *Having the Diameter and Weight of one Bullet, and the Diameter of another of the ſame Metal given ; to find the Weight of the latter.*

The Rule.

THE Weights of Bullets (of the ſame Metal) are in Triplicate Proportion of their Diameters, and wrought by Directions in *Prob.* 10. of the firſt Uſes of the *Gunter*.

Example. *If an Iron Bullet* 4 *Inches Diameter weigh* 9 *Pounds; what will an Iron Bullet of ſix Inches Diameter weigh?* Anſwer, *Pounds* 30.3 *Tenths.* For it is thus;

As 4 to 6, ſo is 9 to 13.5; and ſo is 13.5 to 20.2; and ſo is 20.2 to Pounds 30.3 Tenths.

PROB. V. *Two Bullets equal in Diameter, but of differing Metal; by the Diameter and Weight of one, to find the Weight of the other.*

The Rule.

As the Proportion of one Metal is to the other, ſo is the Weight of the given Bullet to the Weight of the Bullet requir'd.

Example. *Suppoſe an Iron Bullet* 6 *Inches Diameter, weigh Pounds* 30.3 *Tenths; what will a Stone Bullet of the ſame Diameter weigh?* Anſwer, *Pounds* 11.36 *parts.* For it is wrought thus;

By *Prob.* 2. Of Gunnery, the Proportion of Iron and Stone, is as 8 to 3; therefore ſay,

As 8 is to 3, ſo is 30.3 to Pounds 11.36 parts.

PROB. VI. *Having the Diameter and Weight of a Bullet of one kind of Metal, and the Diameter of another Bullet of another Metal given, to find the Weight of the latter.*

The Rule.

1. Find the Weight of it (by *Prob.* 4.) as if it were of the ſame Metal.

2. Then find its Weight according to the Proportion of the Metals, by the laſt Problem, and it's done.

Example. *If an Iron Bullet* 4 *Inches Diameter weigh* 9 *Pounds; what is the Weight of a Leaden Bullet* 6 *Inches Diameter?* Anſwer, *Pounds* 45.45 *parts.* For it is thus wrought;

1. As 4 to 6, ſo is 9 to 13.5; and ſo is 13.5 to 20.2;

and ſo is 20.2 to Pounds 30.3 Tenths, if it had been Iron; but being it's Lead; ſay,

2. As 2 is to 3, ſo is 30.3 to Pounds 45.45 parts, the Weight being Lead.

V. *The Uſe of* Gunter's Scale *in* Navigation; *and firſt in* Plain Sailing.

CASE I.

Courſe and Diſtance ſail'd given; to find the Difference of Latitude and Departure from the Meridian.

To do this, the Proportions are theſe;

1. AS Radius is to the Diſtance, ſo is the Sine of the Courſe to the Departure from the Meridian.

2. As Radius is to the Diſtance ſail'd, ſo is the Sine Complement of the Courſe to the Difference of Latitude.

Note, The Radius, according to the Nature of the Proportion, may be any of theſe;

8 Points	on the Line of	Sine Rumbs.
4 Points		Tangent Rumbs.
90 Degrees		Sines.
45 Degrees		Tangents.

And for Conveniency, that each Proportion may ſtand in one Line.

Let S.	ſtand for	Sine.
S. c.		Sine Complement.
T.		Tangent.
T. c.		Tangent Complement.
Cr.		Courſe.
Diſt.		Diſtance ſail'd.
Diff. Lat.		Difference of Latitude.
Dep.		Departure from the Meridian.

Example. *If a Ship ſails S. W. by S.* 104 *Minutes from Latitude* 1 *d.* 45 *m.* North; *I demand what Latitude ſhe is in, and her Departure from the Meridian?*

As S. 8 Points to 104 } 3 { Points to { Dep. 58 M.
M. ſo is S. } 5 { { Diff. Lat. 86 M.

1. *By Gunter with Compaſſes.*

The Extent from 8 Points (on the *Line of Sine Rumbs*) to 104 M. (on the *Line of Numbers*) will reach (the ſame way) from 3 Points (on the *Line of Sine Rumbs*) to 58 M. (on the *Line of Numbers*) which is the Departure from the Meridian. And the Compaſſes kept at the ſame Diſtance will reach (the ſame way) from 5 Points (on the *Line of Sine Rumbs*) to 86 M. (on the *Line of Numbers*) which is the Difference of Latitude.

Note, The Courſe is 3 Points, becauſe S. W. by S. is 3 Points from the Meridian or *South,* and 5 Points is the Complement of the Courſe, becauſe S. W. by S. is 5 Points from the Parallel or *Weſt* : Underſtand the like in any other Courſe.

2. *By Sliding Gunter.*

Bring 8 Points (on the lower outſide Piece) againſt 104 M. (in the *Line of Numbers* on the middle Piece ;) then againſt 3 Points (on the firſt) is 58 M. (on the ſecond) the Departure from the Meridian ; and againſt 5 Points (on the firſt) is 86 M. (on the ſecond) the Difference of Latitude.

	d.	m.	
Latitude departed from ——	1	45	*North.*
Difference of Latitude 86 M. or ——	1	26	*Southerly.*
Subtract, gives Latitude requir'd ——	0	19	*North.*

CASE II.

Courſe and Difference of Latitude given ; to find the Diſtance ſail'd, and Departure from the Meridian.

To do this, the Proportions are theſe ;

As S. c. Cr. is to Dif. Lat. ſo is { Radius / S. Cr. } to the { Diſt. / Dep.

Example

Examp. *Suppoſe a Ship ſails* N. N. E. *from the Latitude of* 2 *d.* 15 *m. South, and then, by Obſervation, is in Latitude* 1 *d.* 22 *m.* North; *What is her Diſtance ſail'd, and Departure from the Meridian?*

	d.	m.	
Latitude departed from ————————	2	15	South.
Latitude by Obſervation ————————	1	22	North.
Added, gives the Difference of Latitude	3	37	

The Difference of Latitude 3 d. 37 m. reduc'd into Minutes by multiplying by 60, is 217 Minutes: Then,

As S. 6 Points is to 217 M. ſo is S. $\left\{\begin{matrix}8\\2\end{matrix}\right\}$ Points to $\left\{\begin{matrix}234 \text{ Diſt.}\\90 \text{ Dep.}\end{matrix}\right.$

CASE III. *Courſe and Departure from the Meridian given to find the Diſtance and Difference of Latitude.*

This is perform'd by theſe Proportions.

As S. is to the Cr. Dep. ſo is $\left\{\begin{matrix}\text{Radius}\\\text{S.c. Cr.}\end{matrix}\right\}$ to the $\left\{\begin{matrix}\text{Diſtan}\\\text{Diff. Lat.}\end{matrix}\right.$

Examp. *If a Ship Sails* S. E. *by* E. *from* 1 d. 10 m. *North Latitude, till her Departure be* 92 *Minutes; What is her Diſtance Sail'd, and Latitude ſhe is in?*

As S. 5 Points is to 92 m. ſo is S. $\left\{\begin{matrix}8\\3\end{matrix}\right\}$ Points to $\left\{\begin{matrix}110 \text{ the Diſt.}\\61 \text{ the dif. lat.}\end{matrix}\right.$

CASE IV. *Diſtance and Difference of Latitude given; to find the Courſe and Departure from the Meridian.*

The Proportions are theſe;

1. As the Diſtance Sail'd is to Radius, ſo is the Difference of Latittude to the Sine Complement of the Courſe.

2. As the Radius is to the Diſtance Sail'd, ſo is the Sine of the Courſe to the Departure from the Meridian.

Examp.

Example. *Admit a Ship ſails South Weſtward* 98 *Leagues from the* Lizard, *in Latitude* 50 *d.* 10 *m. North*; *and then by Obſervation, is in* 46 *d.* 40 *m. North Latitude*; *What is her Courſe and Departure from the Meridian?*

	d.	m.
Latitude departed from ————————	50	10 *North.*
Latitude by obſervatien ————————	46	40 *North.*
The Difference of Latitude ———	3	30 or 70 Leag.

1. As 98 Leagues is to S. 90d. ſo is 70 Leagues to 45d. 30 m. whoſe Complement 44d. 30m. is the Courſe from the *South* Weſtward; that is, S.W. neareſt: Then.

2. As S. 90d. is to 98 Leagues, ſo is S. 44d. 30m. to 68 Leagues, the Departure from the Meridian.

1. *By Gunter with Compaſſes.*

1. The Extent from 98 Leag. (in the *Line of Numbers*) to 90 Degrees (in the *Line of Sines*) will reach the ſame way from 70 Leag. (in the *Line of Numbers*) to 45 deg. 30 min. (in the *Line of Sines*) which being ſubtracted from 90 deg. leaves 44 deg. 30 min. for the Courſe.

2. The Extent from 90 Degrees (in the *Line of Sines*) to 98 Leagues (in the *Line of Numbers*) will reach from 44 Degrees 30 Min. (in the *Line of Sines*) to 68 Leagues (in the *Line of Numbers*) which is the Departure from the Meridian.

2. *By Sliding Gunter.*

1. Bring 98 Leagues (in the *Line of Numbers* and on the middle Piece) againſt 90 deg. (in the *Line of Sines*, on the outſide Piece;) then right againſt 70 Leag. on the firſt is 45 d. 30m. on the ſecond, which is the Complement of the Courſe.

2. And as it now ſtands againſt 44 d. 30 m. (in the *Line of Sines*, on the outſide Piece) is 68 Leag. (in the *Line of Numbers*, on the middle Piece,) which is the Departure as before.

CASE V. *Diſtance and Departure given; to find the Courſe and Difference of Latitude.*

The Operations are as follow.

1. AS the Diſtance Sail'd is to Radius, ſo is the Departure to the Sine of the Courſe.

2. As Radius is to the Diſtance Sail'd, ſo is the Sine Complement of the Courſe to the Difference of Latitude.

Examp. *A Ship runneth 354 Minutes North Eaſtward from 1 d. 19 m. South Latitude, until her Departure be 150 Minutes: What is her Courſe and Latitude ſhe is in?*

1. As 354 min. is to S. 90 deg. ſo is 150 min. to Sine 25 deg. the Courſe North Eaſtward, or N.N.E. ¼ E.

2. As S, 90 deg. is to 354 minutes, ſo is S. 65 degrees to 323 minutes, the Defference of Latitude.

	d.	m.	
Latitude departed from, is ———————	1	19	*South.*
The Difference of Latit. 323 min. or ———	5	23	
Subtract, gives Latit. the Ship is in ———	3	04	*North.*

CASE VI. *Difference of Latitude and Departure given; to find the Courſe and Diſtance.*

To do this, theſe are the Proportions,

1. AS the Difference of Latitude is to the Departure from the Meridian, ſo is Radius to the Tangent of the Courſe.

2. As the Sine of the Courſe is to the Departure from the Meridian, ſo is Radius to the Diſtance Sail'd.

Examp. *Sailing between the North and the Weſt, from 1 d. 59 m. South Latitude, and then arriveth at another Port which is in 3 d. 8 m. North Latitude, and is alſo 209 Minutes to the Weſtward of the firſt Port; I demand the Courſe and Diſtance from the firſt Port to the ſecond?*

Latitude of the firſt Port ——————— 1 59 *South.*
Latitude of the ſecond Port —————— 3 8 *North.*

Added, gives Diff. Latitude ————— 5 7 or 307 m.

1. As 307 min. is to 209 min. ſo is Tang. 45 d. to Tang. 34 d. 15 m. The Courſe North Weſtward, or N.W. by N. neareſt.

2. As S. 34 degrees 15 minutes is to 209 minutes, ſo is S. 90 degrees to 370 minutes the Diſtance between the Ports.

1. *By Gunter with Compaſſes.*

1. The Extent from 307 min. to 209 min. (in the Line of Numbers) will reach from 45 deg. (in the Line of Tangents, that now being the Radius) to 34 deg. 15 min. (in the ſame Line of Tangents) which is the Courſe from the Meridian.

Note, If the $\left\{\begin{array}{l}\text{Diff.Lat.}\\ \text{Depart.}\end{array}\right\}$ be greateſt, the Cr. is $\left\{\begin{array}{l}\text{leſs}\\ \text{more}\end{array}\right\}$ than 45 deg. from the Meridian.

2. The Second Cannon for the diſtance is wrought, as in *Caſe* the 3d.

2. *By Sliding Gunter.*

1. In this Caſe, ſo put in the middle piece, that a Tangent Line may ſlide by and next a Tangent Line, alſo Numbers againſt Numbers: Then bring 307 min. (in the Line of Numbers on the middle piece) againſt 209 min. (in the Line of Numbers on the outſide piece;) then againſt 45 deg. (in the Line of Tangents on the middle piece) is 34 deg. 15 min. (in the Tangents on the outſide piece) which is the Courſe requir'd.

2. For the Diſtance, the manner of working is the ſame as hath been ſhew'd in Caſe 1ſt, 2d, 3d.

To reſolve a Traverſe by Gunter.

Example 1.

A Ship in Latitude 40 *Degrees North, and Longitude* 5

Degrees 24 Minutes Weſt; ſhe ſails firſt S. E. by S. 68 Minutes, then S. W. by W. 55 Minutes, and then W.N.W. 75 Minutes; I demand the Courſe and Diſtance from the firſt Place of Departure, and what Latitude and Longitude ſhe is now in?

To do this, firſt find the Difference of Latitude and Departure from the Meridian for each ſeveral Courſe, as directed in *Caſe* firſt of Plain Sailing.

2. Collect the ſeveral Differences of Latitude, whether *North* or *South*, into one Sum; and in like manner, the ſeveral Departures, either *Eaſt* or *Weſt*; taking the Difference of the Northing and Southing for the Difference of Latitude; and the Difference of the Eaſting and Weſting, for the Departure from the Meridian.

3. Having now the Difference of Latitude, and the Departure known, the Courſe and Diſtance may be found by the *6th Caſe* of Plain Sailing.

4. The Difference of Longitude, may be found by this Proportion;

As the Sine Complement of the middle Latitude is to the Departure from the Meridian, ſo is Radius to the Difference of Longitude. See the Work following.

	Pts. M.	
1 Courſe, As S. 8 Points to 68′ ſo S.	3 to 38	Eaſting.
	5 to 57	Southing.
2 Courſe, As S. 8 Points to 55′ ſo S.	5 to 46	Weſting.
	3 to 30.6	Southing.
3 Courſe, As S. 8 Points to 75′ ſo S.	6 to 69.5	Weſting.
	2 to 28.8	Northing.

Courſes.

		Diff.	Lat.	Departure.	
Courſes.	Diſt.	North	South.	Eaſt	Weſt.
1. S. E. by S.	68		57	38.	
2. S.W.by W.	55		30.6		46.
3 W.N.W.	75	28.8			69.5
			87.6		115.5
			28.8		38.
	Diff.	Lat.	58.8		77.05 Dep. Then.

m. m d. d. m.
3. As 58.8 is to 77.5, ſo is T. 45 to T. 52.50. the Courſe from the South towards the Weſt; that is S.W. $\frac{1}{4}$ W. almoſt. And again,

As S. 52 d. 50 m. is to 77.5, ſo is S. 90 d. to 97. m. the Diſtance from the firſt Place of Departure.

	d.	m.	
Latitude departed from ————————	40	00	North.
The Difference of Latitude 58.8 or	0	59	Southerly
Subtract, gives the Lat. the Ship is in	39	01	North.
Therefore the middle Latitude is	39	30	
Subtracted from ————————	90	00	
Makes Comp. of middle Latitude	50	30	

4. As S. 50 d. 30 m. is to 77.5, ſo is S. 90 d. to 100 m. the difference of Longitude.

	d.	m.	
The Longitude departed from is ——	5	24	Weſt.
The difference of Longit. 100 m. or	1	40	Weſting.
Added, gives the Long. the Ship is in	7	14	Weſt.

Examp. 2. *A Ship in Latitude* 41 *d.* 30 *m. North, and Longitude* 10 *d.* 20 *m. Eaſt, ſails theſe ſeveral Courſes and Diſtances,* viz. *S. E. by S.* 52 *Minutes, then S. S. W.* 63 *min. E. by N.* 47 *m. N. by E.* $\frac{1}{2}$ *E.* 35 *m. N. N. W.* $\frac{1}{4}$ *W.* 47 *m. W. N. W.* 73 *m. I demand the Courſe*

Courſe and Diſtance from the firſt Place of Departure, alſo the Latitude and Longitude ſhe is in?

1. For the doing of which, obſerve the Work following;

	Courſe. As S. 8 Po. is to	M.	, ſo is S.	Point	to	M.
1	——— ———	52	———	3 5		28.8 E 43.2 S
2	——— ———	63	———	2 6		24.2 W 58.5 S
3	——— ———	47	———	1 7		46.2 E 9.2 N
4	——— ———	35	———	1½ 6¼		10.2 E 36.6 N
5	——— ———	47	———	2¾ 5		20 W 42.5 N
6	——— ———	73	———	6 2		68 W 28 N

2. Then collect the ſeveral Northings, Southings, Eaſtings and Weſtings into one, as here you ſee in the Table following; whereby you will have the difference of Latitude and Departure from the Meridian.

Courſes.	Diſt.	Diff. Lat. North.	Diff. Lat. South.	Departure. Eaſt.	Departure. Weſt.
1. S. E. by S.	52		43.2	28.8	
2. S. S. W.	63		58.5		24.2
3. E. by N.	47	9.2		46.2	
4. N. by E. ½ E.	35	33.6		10.2	
5. N.N.W. ¼ W.	47	42.5			20.
6. W. N. W.	73	28.			68.
		113.3	101.7	85.2	112.2
		101.7			85.2
	Diff. Lat.	11.6	Departure		27.0

3. Now having the Diff. Lat. and the Departure known, the Courſe and Diſtance is thus found;

m.

m. m. d. d. m.

As 11.6 is to 27, ſo is T. 45 to T. 66.40: The Courſe from the *North* Weſtward, or, W.N.W. neareſt.

Here obſerve the Courſe is more than 45 degrees from the Meridian, becauſe the Departure is more than the Difference of Latitude; according to the Note in the 6th Caſe of Plain Sailing: Then for the Diſtance, ſay,

d. m. m. d. d. m.

As S. 66.40 is to 27, ſo is S. 90 to 29.5: The Diſtance from the firſt Place of Departure.

	d.	m.	
Latitude departed from ———————	41	30	*North.*
The Diff. Lat. 11.6 m. or, ———————		12	*North.*
Added, gives the Latit. the Ship is in —	41	42	*North.*
And the middle Latitude is ———————	41	36	
Subtracted from ———————	90	00	
Leaves Compl. of middle Latitude ———	48	24	

4. Then to find the Difference of Longitude; ſay,
As S. 48 d. 24 m. is to 27 m. ſo is S. 90 d. to 36 m. the difference of Longitude.

	d.	m.	
The Longitude departed from, is ———	10	20	*Eaſt.*
The Difference of Longit. 36 m. or, ——		36	*Weſt.*
Subtract, gives the Longit. the Ship is in	09	44	*Eaſt.*

Secondly in Mercator's Sailing.

CASE I.

The Latitude and Longitude of two Places given; to find their Courſe and Diſtance.

Example. *I demand the Courſe and Diſtance from the* Lizard *to* Barbadoes, *their Latitudes and Longitudes being ſuppos'd to be as follows:* d. m.

		d. m.			d. m.	
Lizard	Lat.	50. 10	North	Long.	5. 24	W.
Barbadoes		13. 10	North		57. 24	W.
The diff. Latitude		37.	South.	diff. Long.	52.	W.
		60			60	
Minutes		2220		Minutes	3120	

To Anſwer this Queſtion, the Proportions are theſe;

1. As the Meridional Difference of Latitude is to the difference of Longitude, ſo is Radius to the Tangent of the Courſe.

2. As the Sine Complement of the Courſe is to the Difference of Latitude, ſo is Radius to the Diſtance of the two Places.

The Meridional Difference of Latitude is thus found; Extend the Compaſſes in the Meridian Line from one Latitude to the other; that Extent meaſured in the *Equinoctial Line* (the Line next joining to the *Meridian Line*) gives the Meridional Difference of Latitude.

Thus the Extent from Lat. 50 d. 10 m. to Lat. 13 d. 10 m. in the firſt, being meaſured on the latter, is 45 d. or 2700 m. the Medridional Difference of Latitude: Then it is. d. d.

As 2700m. is to 3120m. } ſo is T. 45 to T. 49. The
Or, As 45 d. is to 52 d. }
Courſe from the South weſtward, or S. W. 4 deg. weſterly. And again.

As S. 41 is to 2220 m. ſo is S. 90 d. to 3390 m.

Or, As S. 41 d. is to 37 d. ſo is S. 90 d. to 56 d. 30 m. ſo that the diſtance is 56 d. 30 m. or 3390 minutes.

CASE II.

Both Latitudes and Courſes given; to find the Diſtance and Difference of Longitude.

The Proportions are theſe

1. AS the Sine Complement of the Courſe is to the difference of Latitude, *&c.* as before in the 2d.

Caſe of Plain-Sailing, to find the Diſtance and the Departure from the Meridian.

2. As the Sine Complement of the middle Latitude is to the Departure, ſo is Radius to the Difference of Longitude.

Or thus; As the Sine Complement of the Courſe is to the Meridional Difference of Latitude, ſo is the Sine of the Courſe to the Difference of Longitude.

Example. *Admit from the* Lizard *in* 50 *d.* 10 *m.* North *Latitude, and Longitude* 5 *d.* 24 *m.* Weſt, *we made (when Lee-way Variation allow'd for) our Courſe to be* South 39 *d. Weſterly, and then by Obſervation is in Latitude* 45 *d.* 11 *m.* North; *I demand her Diſtance run, and what Longitude ſhe is in?*

Latitude Departed from———50 d 10 m. North.
Latitude by Obſervation———45 11 North.
Subtract, is the diff. of Latitude——4 59 Southerly.
60
Minutes 299
The middle Latitude, is——47 d. 40 m.
Subtract from———90
Leaves Com. of the middle Lat.——42 20

1. As S. 51 d. is to 299m. ſo is S.$\left\{\begin{matrix}90\\39\end{matrix}\right\}$d. to$\left\{\begin{matrix}385'\text{ diſ.}\\242'\text{dep.}\end{matrix}\right.$

As S. 42 d. 20 m. is to 242 m. ſo is S. 90d. to 358 m. the difference of Longit: Or thus; The Extent from 50 d. 10 m. to 45 d. 11 m. in the Meredian Line, meaſured in the equal Parts, is 7 d. 20 m. or 440 m. for the Meridional Difference of Latitude: Then,

As S. 51 d. is to 440 m. ſo is S. 39 d. to 358 m. Or thus;

As 299m. is to 242 m. ſo is 440 m. to 358 m. as before, which is the Difference of Longitude,

The

	d.	m.	
The Longitude departed from —— ——	5	24	*Weſt.*
The Difference of Longit. 358 m. or, ——	5	58	*Weſt.*
Added, gives the Longit. the Ship is in—	11	22	*Weſt*

CASE III.

Both Latitudes, and Diſtance given; to find the Courſe and Difference of Longitude.

To perform this, the Proportions are theſe.

1. AS the Diſtance is to Radius, ſo is the Difference of Latitude to the Sine Complement of the Courſe; as in the 4th *Caſe of Plain-Sailing*, by which alſo you may find the Departure or Meridional Diſtance

2. As the Sine Complement of the middle Latitude is to the Departure, ſo is Radius to the Difference of Longitude: Or thus;

As the Difference of Latitude is to the Departure, ſo is the Meridional Difference of Latitude to the Difference of Longitude,

Example. *A Ship in Latitude* 46 *d.* South, *and Longitude* 1 *d.* 15 *m.* Weſt, *ſails* 100 *Leagues* North *Eaſtward, and then by Obſervation is in Latitude* 42 *d.* South; *I demand her Courſe, Departure, and Longitude ſhe is in?*

Latitude departed from, is 46 d. *South.*
Latitude by Obſervation, is 42 d. *South.*
Subtract, gives the diff. lat. 4 d. or 80 Leagues.

The middle Latitude, is — 44 d. whoſe Comp. is 46 d.

1. As 100 Leagues is to S. 90 d. ſo is 80 Leag. to S. 53 deg. 15 m. the Complement of the Courſe; ſo that the Courſe is 36 deg. 45 min. North Eaſtward, or N.E. by N. $\frac{5}{4}$ E. And then again,

As S. 90 d. is to 100 Leag. ſo is S. 36 d. 45 m. to 60 Leag. the Departure from the Meridian.

2. As S. 46 d. is to 60 Leag. ſo is S. 90 d. to 83 leag. the difference of Longitude: Or thus, The Extent from

46

46 d. to 42 d. on the Meridian Line, makes 5 d. 30 m. or 100 Leag. (on the equal Parts) which is the Meridional Difference of Latitude: And then it is,

$\left.\begin{array}{l}\text{As 80 Leag. is to 60 L. ſo is 100 L. to 83 L.}\\ \text{Or, as 4d. is to 3d. ſo is 5d. 30m. to 4d. 9 m.}\end{array}\right\}$ diff. long.

Longitude departed from; is ——— 1 d. 15 m. *Weſt.*
The Diff. of Longitude 83 Leag. or — 4 d. 9 m. *Eaſt.*
Subtract, gives Longitude Ship is in 2 d. 54 m. *Eaſt.*

CASE IV.

Both Latitudes and Departure given; to find the Courſe, Diſtance, and Difference of Longitude.

1. THE Courſe and Diſtance is found by the 6th *Caſe* of Plain-Sailing.

2. The Difference of Longitude is found, as in the laſt *Caſe*, or any other *Caſe* in *Mercator.*

Example, *A Ship in Latitude* 33 *d.* North, *and Longitud* 178 *d.* Weſt, *ſhe ſails* South Weſtward *until ſhe be departed from the Meridian* 58 *Leagues, and then ſhe is in Latitude* 28 *d.* 36 *m.* North; *I demand her Courſe, Diſtance, and what Longitude ſhe is in?*

	d.	m.	
Latitude departed from ———	33		*North.*
Latitude ſhe is in ———	28	36	*North.*
The difference of Latit. is ——	4	24	or, 88 Leagues.
The middle Latitude, is ———	30	48	the Com. 59. 12

1. As 88 Leagues is to 58 Leag. ſo is T. 45 d. to T. 33 d. 20 m. which is the Courſe *South Weſterly*, or S.W. by S.

2. As S. 33 d. 20 m. is to 58 Leag. ſo is S. 90 d. to 105 Leag. the diſtance ſail'd.

3. The Meridional difference of Latitude, is 5 d. 10 m. or 103 Leagues.

4. As $\left\{\begin{array}{l}\text{S. }59^\circ.\ 12'\\ \text{88 Leag.}\end{array}\right\}$ is to 58 Leag ſo is $\left\{\begin{array}{l}\text{S. 90 deg.}\\ \text{103 leag.}\end{array}\right\}$ to 67 Leagues, the difference of Longitude.

5.

d. m.
5. Longitude departed from, is ——— 178 0 Weſt.
The Diff. of Long. 67 Leag. or ——— 3 21 Weſt.
Added, and the Sum is, ——— 181 21
Which ſubtract from ——— 360 0
Remainder, is Long. the Ship is in ——— 178 39

CASE V.

One Latitude, Courſe and Diſtance given; to find the other Latitude and Difference of Longitude.

1. THE Difference of Latitude, and Departure from the Meridian, is found by the firſt *Caſe* of Plain Sailing; and conſequently the other Latitude.

2. The Difference of Longitude, is found as before, in the 2d or 3d *Caſe* of *Mercator*.

Example. *If a Ship ſails S.E. by S.* 120 *Leagues, from a Port in Latitude* 53 *d.* 30 *m.* North, *and Longitude* 2 *d.* 15 *m.* Weſt; *what Latitude and Longitude is ſhe now in?*

1. As S. 8 Pts to 120 Leag. ſo is S. {5 / 3} Pts to {100 Leag. Diff. Lat. / 67 Leag. Departure.

d. m.
2. Latitude departed from, is ——— 53 30 *North.*
The diff. of Lat. 100 Leag. or ——— 5
Subtract, gives Lat. ſhe is in ——— 48 30 *North.*
And the middle Latitude, is ——— 51 Comp. 39d.
3. The Meridional Diff. Lat. is 8d. or 160 Leagues.

4. As {S. 39 d. / 100 Leag.} is to 67 Leag. ſo is {S. 90d. / 160 leag.} to 106 Leag. the Difference of Longitude.

d. m.

	d.	m.	
5. Longitude departed from, is	2	15	*Weſt.*
The Diff. Long. 106. 5 Leag. or	5	20	*Eaſting.*
Subtract, gives the Longit. ſhe is in	3	05	*Eaſt.*

CASE VI.

Sailing in a Parallel; to find the Difference of Longitude.

To do this, the Proportion is thus;

AS the Sine Complement of the Parallel or Latitude is to the Diſtance ſail'd (*Eaſt* or *Weſt*) ſo is Radius to the Difference of Longitude.

Example. *If a Ship ſails* Weſt 390 *Minutes, in the Latitude of* 50 *d.* 10 *m. and departs from the Longitude of* 2 *d.* 45 *m.* Eaſt; *I demand what Longitude the Ship is now in?*

1. As S. 39 d. 50 m. is to 390 m. ſo is S. 90 d. to 610 m. the Difference of Longitude.

	d.	m.	
2. Longitude departed from	02	45	*Eaſt.*
The Diff. Long. 610 m. or	10	10	*Weſting.*
Subtract, gives Long. ſhe is in	07	25	*Weſt.*

CASE VII.

The Difference of Longitude given of two Places in one Parallel or Latitude; to find their Diſtance in that Parallel.

The Proportion is thus.

AS Radius is to the Difference of Longitude, ſo is the Sine Complement of the Latitude to the Diſtance in that Parallel.

Example 1. *Suppoſe* Cape Vincent *in* Portugal, *and* Cape Henry *in* Virginia, *both in the Latitude of* 37 deg. North; *their Longitude ſuppoſ'd to be as follows;*

Cape St. Vincent. } *Longitude.* { 8 deg. 25 min. *Weſt.*
Cape Henry——} { 74 deg. *Weſt.*

What is their Diſtance in their Parallel?

d. — d. m.
1. Latitude is, 37N. Longitudes are, { 8 25 *Weſt.* / 74 *Weſt.*
Take from 90
Comp. Latit. 53 The Diff. Longitude is 65 35 *Weſt.*

d. d. d. m. d. m.
2. As S.90 is to S.53, so ——— { 65.35 / 3935m. } to { 52 30 / 3150m. } the Diſtance required.

Example 2. *Suppoſe Two Ships under the Equinoctial, and* 100 *Leagues aſunder, and each ſails* North *till both come into Latitude* 60 d. *How far are they now aſunder?* Anſwer 50 *Leagues.* For it is,

As S.90 deg. is to S. 30 deg. ſo is 100 Leagues to 50 Leagues, the Diſtance requir'd.

CASE VIII.

To find how many Minutes or Miles make a Degree of Longitude, make in any Parallel of Latitude.

The Rule.

As Radius is to the Complement of the Latitude, ſo is 60 Minutes (a Degree in the Equinoctial) to the Minutes making a Degree of Longitude requir'd.

Example *In the Latitude of* 50 d. *I demand how many Minutes (of Eaſting or Weſting) make a Degree of Longitude?* Anſwer, 38½ *Minutes.* For it is.

d. d. m. m.
As S. 90 is to S. 40, ſo is 60 to 38.5 or 38 and a half to make one Degree of Longitude in Latitude 50 d.

This may be done by the Plain Scale, thus;

Take the given Latitude from the Chords, and meaſure it on the Line M. L. (which is Miles of Longitude) ſheweth your deſire: So here take 50 deg. from the Chords, and meaſure on the Scale M. L. it ſheweth 38 and a half min. as before.

VI. *The Uſe of* Gunter's Scale *in* Aſtronomy.

PROB. I. *The Sun's Place in the Ecliptick, and his greateſt Declination given; to find his Right Aſcenſion and preſent Declination.*

To perform this, theſe are the Proportions;

1. AS Radius is to the Sine Complement of the Sun's greateſt Declination, ſo is the Tangent of his Longitude (from the neareſt Equinoctial Point) to the Tangent of his Right Aſcenſion (from the ſaid Point.)

The Names and Characters of the 12 Signs.

♈ *Aries*,
♉ *Taurus*,
♊ *Gemini*,
♋ *Cancer*,
♌ *Leo*,
♍ *Virgo*,

♎ *Libra*,
♏ *Scorpio*,
♐ *Sagittaris*,
♑ *Capricornus*,
♒ *Aquarius*,
♓ *Piſces*.

Note 1. The Sun's greateſt Declination is 23 Degrees 30 Minutes.

2. The beginning of ♈ and ♎ are the Two Equinoctial Points.

3. This Proportion above, finds the Sun's Right Aſcenſion only when he is in the firſt Quarter of the Ecliptick; that is, ♈, ♉, or ♊: But when he is in the ſecond Quarter, ♋, ♌, or ♍, ſubtract it from 180 deg. and when in ♎, ♏, or ♐, add it to 180 Degrees: And

n the laſt Quarter, ♑, ♒, or ♓, ſubtract (what's found by this Operation) from 360 deg. ſo will you have the Sun's Right Aſcenſion from ♈ (for any Place of the Ecliptick deſired.

2. As Radius is to the Sine of the Sun's Longitude from the neareſt Equinoctial Point, ſo is the Sine of his greateſt Declination to the Sine of his preſent Declination.

Note, The Sun being in ♈, ♉, ♊, ♋, ♌, or ♍, his Declination is *North*, but in ♎, ♏, ♐, ♑, ♒ or ♓, it's *South*.

Example. *When the Sun's place in the Ecliptick is* ♉ 24 *d.* 15 *m. What's his Right Aſcenſion and Declination?*

0:42 The Sun being in ♉ 24 Degrees 15 Minutes, his Longitude from the neareſt Equinoctial Point (being now the beginning of ♈) is 54 Degrees 15 Minutes. And the Complement of his greateſt Declination always is 66 Degrees 30 Minutes. Then it follows;

1. As S. 90 Degrees is to S. 66 Degrees 30 Minutes, ſo is T. 54 Degrees 15 Minutes, to T. 51 Deg. 50 Min. the Sun's Right Aſcenſion (from the beginning of ♈) requir'd.

1. *By Gunter, with Compaſſes.*

The Extent from 90 Degrees to 66 Degrees 30 Minutes in the *Line of Sines*, will reach in the *Line of Tangents*, from 54 Degrees 15 Minutes, to 51 Deg. 50 Min. the Right Aſcenſion.

2. *By a Sliding Gunter.*

1. Let the middle Piece be ſo put in, that Sines may ſlide againſt Sines, and Tangents againſt Tangents.

2. Then bring 90 deg. in Sines (on the out-ſide Piece) againſt 66 deg. 30 min. in Sines (on the middle Piece) then againſt 45 deg. 15 min. in Tangents (on the ſecond Piece) is 51 deg. 50 min. in Tangents (on the outſide Piece) the Right Aſcenſion as above.

This Proportion being to be wrought on Sines and Tangents jointly, I thought it neceſſary to expreſs the manner of its Operation on both ſorts of Gunters, that the Learner might ſee how it agrees with the General Rule given at the beginning of this Diſcourſe of the Gunter; but ſhall wave it in the reſt, and only write the Proportions in Words and in Figures, according to the particular Example; as here follows for the Sun's Declination in the foregoing Example.

2. As S. 90 deg. is to S. 54 deg. 15 min. ſo is S. 23 deg. 30 min. to S. 18 deg. 52 min. the Sun's Declination North.

PROB. II.

The Latitude of a Place, and the Sun's Declination given; to find his Amplitude, and the Aſcenſional Difference; and conſequently his Riſing or Setting, and the Length of the Day or Night.

To perform this Problem, the Proportions are theſe;

1. As the Sine Complement of the Latitude, is to Radius, ſo is the Sine of the Sun's Declination to the Sine of his Amplitude.

Note, The Amplitude and Declination are always of one kind, that is, both North or both South.

2. As Radius is to the Tangent of the Latitude, ſo is the Tangent of the Sun's Declination to the Sine of his Aſcenſional Difference.

Note 1. The Aſcenſional Difference (being reduced into Time, by allowing 15 deg. for one hour, and then) added to, and ſubtracted from 6 hours, the one is Sun-riſing, the other is Setting.

2. If Latitude and Declination are both *North*, or both *South*, the Sun riſeth before, and ſets after 6 of the Clock; but if one be *North*, and the other *South*, the contrary.

3. If

3. If the Riſing and Setting be doubled ſeverally, the firſt is the Length of the Night, and the latter the Length of the Day.

4. By this Problem were the Tables of Amplitudes, and Semidiurnal Arches, &c. calculated.

Example.

Latitude 51 *deg.* 32 *min. North, and the Sun's Declination* 23 *deg.* 30 *min. North; I demand his Amplitude and Aſcenſional Difference? Alſo his Riſing, Setting, Length of the Day and Night.*

	d.	m.		d.	m.
Anſw. His Amplitude	39	50,	Aſcenſ. Diff.	33	10
Sun-ſetting hour	8	13,	length of Day	16	26
Sun-riſing hour	3	47,	length Night	7	34

For it is thus,

1. As S. 38 deg. 28 min. is to S. 90 deg. ſo is S. 23d. 30 min. to S. 39 deg. 50 min. the Amplitude North, becauſe the Declination is North.

2. As T. 45 deg. is to T. 51 deg. 32 m. ſo is T. 23d. 30m. to T. 18 deg. 40 m. againſt which, in S. is 33d. 10 min. the Aſcenſional Differenee; which being reduc'd into Time, is 2 hours 13 minutes, and added to 6 hours, is 8 hours 13 minutes, Sun-ſetting; which doubled, is 16 hours 26 minutes, the length of the Day.

Again, 2 hours 13 minutes ſubtracted from 6 hours is 3 hours 47 minutes Sun-riſing; which doubled, is 7 hours 34 minutes, length of the Night.

PROB. III. *Latitude of a Place, and the Sun's Declination given; to find his Altitude and Azimuth at* 6 *of the Clock.*

To ſolve this Problem.

1. AS Radius is to the Sine of the Latitude, ſo is the Sine of his Declination to the Sine of his Altitude at 6 of the Clock.

2. As Radius is to the Sine of the Complement of the Latitude, ſo is the Tangent of the Sun's Declination to the Tangent of his Azimuth (from the Eaſt or Weſt) at 6 of the Clock.

Note; The Azimuth is from the Eaſt at 6 in the Morning, and from the Weſt at 6 in the Afternoon: Northerly in North Latitude, but Southerly in South.

Example. *In Latitude* 51 d. 32 m. *North, the Sun's Declination being* 23 d. 30 m. *North; What is his Altitude and Azimuth at 6 of the Clock.*

Anſw. His Altitude is 18 d. 12 m. and his Azimuth is 15 d. 10 m. Northerly, or 74 d. 50 m. North Eaſterly or Weſterly. For it is thus,

1. As S. 90 d. is to S. 51 d. 32 m. ſo is S. 23 d. 30 m. to S. 18 d. 12 m. the Altitude at 6 of the Clock.

2. As S. 90 d. is to S. 38 d. 28 m. ſo is T. 23 d. 30 m. to T. 15 d. 10 m the Azimuth at 6; that is, 74 d. 50 m. North Eaſterly in the Morning; but North Weſterly in the Evening.

PROB. IV.

Latitude of a Place, and the Sun's Declination given; to find his Altitude, and Hour of the Day when he is Eaſt or Weſt.

To perform this, the Proportions are theſe;

1. AS the Sine of the Latitude is to Radius, ſo is the Sine of the Sun's Declination to the Sine of his Altitude; being *Eaſt* or *Weſt*.

2. As Radius is to the Tangent Complement of the Latitude, ſo is the Tangent of the Sun's Declination to the Sine of the Hour from 6 of the Clock, when he is *Eaſt* or *Weſt*.

Note 1. The Sun is *Eaſt* after 6 in the Morning, but *Weſt* before 6 in the Evening.

2. The Hour found by the laſt Proportion being re-

duced into Time (by allowing 15d. to an Hour) and added to, or ſubtracted from 6, giveth the Hour of the Day requir'd.

Example. *In Latitude* 51 d 30m. North, *the Sun's Declination being* 23 d. 30 m. North; *What is his Altitude? And what time of the Day is it when he is* Eaſt *or* Weſt?

Anſw. His Altitude is 30 d. 35 m. and the Hour of the Day is {
7 h. 21 m. Morning, when *Eaſt*.
4 h. 39 m. Evening, when *Weſt*.

For it is thus,

1. As S. 51 d. 32 m. is to S. 90 d. ſo is S. 23 d. 30m. to S. 30 d. 35 m. the Sun's Altitude being either *Eaſt* or *Weſt*.

2. As T. 45 d. is to T. 38 d. 28 m. ſo is T. 23 d. 30m. to S. 20 d. 15 m. The Hour from 6, which is 1 Hour 21 Minutes, added to 6, is 7 h. 21 m. and ſubtracted from it, is 4 h. 39 m. the former is the Time when *Eaſt* in the Morning, the latter the Time in the Evening when he is *Weſt*.

PROB. V. *The Sun in the Equator or Equinoctial, (that is, when he hath no Declination) the Latitude of a Place, and his Altitude given; to find his Azimuth, and Hour of the Day.*

This Problem is thus effected.

1. AS Radius is to the Tangent of the Latitude, ſo is the Tangent of the Sun's Altitude to the Sine of the Complement of his Azimuth, from the *South* in *North* Latitude; but from the *North* in *South* Latitude; Eaſterly in the Forenoon, and Weſterly Afternoon.

2. As the Sine of the Complement of the Latitude is to Radius, ſo is the Sine of the Sun's Altitude to the Sine of the Complement of the Hour from Noon.

Example. *In Latitude* 51 deg. 32 min. *the Sun having no Declination, and his Altitude being* 21 deg. 50 min. *in the*

the Forenoon; I demand his Azimuth, and the Hour of the Day,

Anſw. His Azimuth is 59 deg. 45 min. *South* Eaſterly; and the Hour of the Day is Hour 8 33 min. Morning. For it is thus;

1. As T. 45 d. is to T. 51 d. 32 m. ſo is T. 21 d. 50 m. to S. 30 deg. 15 min. whoſe Complement is 59 d. 45 m. the Sun's Azimuth requir'd.

2. As S. 38 deg. 28 min. is to S. 90 deg. ſo is S. 21 deg. 50 min. to S. 36 deg. 50 min. whoſe Complement is 53 deg. 10 min. or 3 Hours 23 Minutes; which ſubtracted from 12, gives 8 Hours 33 Minutes, or 33 min. after 8 of the Clock in the Forenoon; the Time of the Day requir'd.

PROB. VI. *Latitude of a Place, Sun's Declination, and his Altitude given; to find his Azimuth, and the Hour of the Day.*

The Performance of this, is thus;

1. TAke the Complement of the Latitude, the Complement of the Altitude, and the Sun's Diſtance from the Pole, (which is his Declination added to 90 d. when the Latitude and Declination is one *North*, the other *South*; but both being either *North* or *South*, it's the Complement of the Declination (and add them together into one Sum.

2. From half that Sum, ſubtract, to find the Azimuth the Sun's Diſtance from the Pole; but to find the Hour the Complement of his Altit. and note the Remainder.

3. *To find the Azimuth, you have theſe two Proportions following.*

1. As Radius is to the Sine of the Complement of the Latitude, ſo is the Sine of the Complement of the Altitude to a 4th Sine. Then again,

2. As that 4th Sine is to the Sine of the half Sum, ſo

is the Sine of the Remainder to a 5th Sine; againſt which in verſed Sines, is the Sun's Azimuth from the *North* in *North* Latitude; but from the *South* in *South* Latitude.

4. *To Find the Hour, theſe are the Proportions which follow.*

1. As Radius is to the Sine of the Complement of the Latitude, ſo is the Sine of the Sun's Diſtance from the Pole to a 4th Sine.

2. As that 4th Sine is to the Sine of the half Sum, ſo is the Sine of the Remainder to a 5th Sine; againſt which in Verſed Sines, is the Hour of the Day from Noon.

Example. *In Latitude* 51 *Degrees* 30 *Minutes* North, *the Sun's Declination being* 15 *Degrees* 10 *Minutes* North, *and his Altitude obſerved to be* 11 *Degrees* 30 *Minutes, I demand his Azimuth, and Hour of the Day?*

	90d.		90d.		90d.
Latitude—	51.30	North Declinat.	15.10	North Alt.	11.30
Comp.Lat.	38.30	Suns diſt.fr. Pole	74.50	Comp. Alt.	78.30
Comp.Alt.	78.30	Comp. Latitude	38.30		
Sun's Diſt.	74.50	Comp. Altitude	78.30		
Sum is—	191.50	Sum is———	191.50		
halfSum is	95.55	The half Sum is	95.55		
Remaind.	21.05	Remainder is —	17.25		

Then to find the Azimuth, it is thus;

1. As Sine 90 deg. is to Sine 38 deg. 30 min. ſo is Sine 78 d. 30 m. to 37 d. 20. m.

2. As Sine 37 d. 20 m. is to Sine 95 d. 55 m. ſo is Sine 21 d. 5 m. to Sine 36 d. againſt which, in Verſed Sines, is 80 d. the Sun's Azimuth from the *North* Eaſterly, if in the Forenoon; but Weſterly in the Evening,

And to find the Hour of the Day, it is thus;

1. As Sine 90 d. is to Sine 38 d. 30 m. ſo is Sine 74 d. 50 m. to Sine 37 d.

2. As Sine 37 d. is to Sine 95 d. 55 m. ſo is Sine 17 d. 25 m. to Sine 29 d. 40 m. againſt which, on Verſed Sines, is 90 d. 30 m. or 6 Hours 2 Minutes, which is the Hour from Noon, that is, 58 Minutes after 5 of the Clock in the Morning, or 2 Minutes after 6 in the Afternoon.

The Deſcription and Uſe of the

SECTOR.

1. THIS Uſeful Inſtrument may be of any Length, but is commonly made 1 Foot 18 Inches, or 2 Foot long, to open in a Joynt in the middle, like a *Carpenter*'s Rule; one Inch and a half, or more, in breadth, and of any thickneſs at pleaſure, according to the Matter its made of; which may be either *Boxwood*, *Ivory*, *Braſs*, or *Silver*.

2. There are two ſorts of *Sectors*, known by the Names of *Gunter* and *Foſter's Sector*; and are ſometimes both put on one Inſtrument; that is, *Gunter's Sector* on one ſide of it, and *Foſter's* on the other.

3. The Lines of *Gunter's Sector*, are theſe; *Line of Lines*, mark'd at the end L. Line of *Sines*, mark'd S. *Superficies*, mark'd Sup. *Solids*, mark'd Sol. Line of *Metals*, Line of *Equated Bodies*, Line of *Inſcribed Bodies*, &c.

4. The Lines of *Foſter's Sector*, are theſe Five, *viz*, *Line of Lines*, or *Equal Parts*, *Chords*, *Sines*, *Tangents* and *Secants*; each mark'd at the end with its Name, or firſt Letter of its Name.

5. All *Sector-Lines* or *Scales*, meet at the Center of the Head (where the Joint is) at the Left-hand, and from thence are figured towards the Right, each being twice repeated; that is, one on each Leg or ſide of the *Sector* anſwering one another.

6. The *Sector* is uſeful in Projection, to reduce, or to make a Scheme to any (poſſible) Magnitude; in proportion, to work any ſtated Canon or analogy in *Arithmetick*, *Geometry*, *Trigonometry*, *Navigation*, *Aſtronomy*, &c. of which I will give a brief Touch, yet ſo as the Learned may be informed how to apply it further.

1. *The Uſe of the Sector Lines for Projection.*

IN Projections it's often required to inlarge, or diminiſh the Scale, that the Draught deſigned may be of its deſired Magnitude; in doing of which, are uſed Lateral and parallel Diſtances, or Extents of the Compaſſes. And to avoid a needleſs laying over the ſame things, take once for all, what is meant by a *Lateral* and a *Parallel Diſtance*, or *Extent of the Compaſſes.*

1. A *Lateral Diſtance* (in any Line or Scale) is the Extent or Diſtance (taken along the length of the Line) from the beginning thereof to any Number (therein) deſired.

As for Example: The *Lateral Sine* of 30d. is the Diſtance of 30 from the beginning of the *Line of Sines* and ſo is it in the *Line of Equal-parts*, *Chords*, *Tangents*, *Secants*, &c.

2. A *Parallel Diſtance* (in any Line or Scale on the Sector) is the Extent or Diſtance (taken acroſs) from any Number in any Line on one Leg of the *Sector*, to the like Number in the like Line on the other Leg.

Or, the neareſt Diſtance from any Number on one Leg (taken acroſs) to the like Line on the other Leg.

As for Example: The *Parallel Sine* of 30 d. is (ſuppoſing the *Sector* open'd to any Angle) the Diſtance from 30 in the *Line of Sines* on one *Leg*, to 30 in the *Line of Sines* on the other Leg.

Or, the neareſt Diſtance from 30 in the *Line of Sines* on one Leg to the *Line of Sines* (that is to ſay, the Line iſſuing from the Center of the Joint or Head) on the other Leg is the *Parallel Sine* of 30 d. In like manner is it done in any other Line.

This being underſtood, the inlarging or diminiſhing of any of the Lines; or the finding a Chord, Sine, Tangent or Secant, to any propoſed Radius will not be difficult; yet for the Learner's further Satisfaction, take a General Rule.

To find a Chord, Sine, Tangent or Secant, &c. to any Radius (greater or leſſer) propoſed.

The General Rule is thus;

1. Take the propoſed Radius in the Compaſſes, and make it a Parallel on the Sector in the Radius of any one Line; that is, open the Sector till the propoſed Radius (in the Compaſſes) be a *parallel Chord* of 60d. in the *Line of Chords*; or a *parallel Sine* of 90d. in the *Line of Sines*; or a *parallel Tangent* of 45d. in the *Line of Tangents*, or a *parallel Secant* of 0d. in the *Line of Secants*; for the Chord of 60, Sine of 90, Tangennt of 45, and Secant of 0d. are equal, and each equal to Radius.

2. The *Sector* being kept at that open'd Diſtance or Angle, any Parallel Diſtance in any Lines will be a Lateral Diſtance on a like Line to the propoſed Radius: that is, a Parallel-Chord of 10, 20, 30, *&c.* is the Chord of 10, 20, 30, *&c.* to the propoſed Radius; alſo, a Parallel Sine, Tangent, and Secant of 20, 30, 40, *&c.* is the Sine, Tangent and Secant of 20, 30, 40, *&c.* to the foreſaid Radius.

2. The Uſe of the Sector in working Proportions.

SUppoſing the Learner underſtands how to take a Lateral Diſtance on the Line of Lines, otherwiſe called Equal parts, on the Chords, Sines, &c. And to apply them parallel in any Line on the *Sector*; the working of any Proportion is thus;

A General Rule to work by the Sector.

1. Take the 2*d* Term Lateral, that is, from the beginning of the Line to the propoſed 2*d* Term, and opening the *Sector*, apply that extent Parallel, that is, acroſs it, in the 1*ſt* Term, there ſtay the *Sector* at that Parallel Extent.

2. Then the Parallel Diſtance taken in the 3d Term, and meaſured laterally gives the 4th Term ſought for or requir'd.

Or briefer thus; As the Lateral 2d Term to the Parallel 1ſt Term, ſo is the Parallel 3d Term to the Lateral 4th Term.

This one Rule is ſufficient for any Proportion whatever, and will appear ſo by a few Examples.

PROB. I. *To multiply by the Line of Lines on a* Sector.

The Proportion is;

AS 1 to the Multiplicand, ſo is the Multiplier to the Product.

Example. *What's the Product of* 8 *multiply'd by* 4?

The Analogy or Proportion is this;

As 1 to 8, ſo is 4 to the Product 32, thus found by the Sector and General Rule aforeſaid.

1. In the Line of Lines, that is the Line of Equal Parts, take the 2d Term 8 Lateral; that is, from the Center of the Joynt, and the beginning of the Line, to 8 in the ſame Line.

2. Open the *Sector* till you fit the (foreſaid Lateral) Diſtance in the Compaſſes a Parallel in 1 and 1, or 10 and 10; that is, ſet it over from 10 to 10 at the end of the ſame Line, and now counted for 1 and 1, the firſt Term; keep the *Sector* juſt at that Angle or opening.

3. The Parallel Diſtance of the 3d Term 4; that is, from 4 to 4, taken a croſs from one Leg to the other in the ſaid Line of Lines, and meaſured Lateral (which is from the beginning of the Line towards the end, and) it's 32, the 4th Term or Product of 8 multiply'd by 4. Or ſhorter, thus;

As the 2d Term 8 (Lateral taken) to the firſt Term 10 Parallels ſet ſo is the 3d Term (Parallel taken in) 4 to the 4th Term Laterally meaſured, in 32, the Product as before, Or thus; As the Lateral 4 to the Parallel 10, counted for 1, ſo is the Parallel 8 to 32, as before.

PROB. II. *To Divide on the Line of Lines on a* Sector.

The Anology or Proportion, is this;

AS the Diviſor is to 1, ſo is the Dividend to the Quotient. Or thus;

As the Diviſor is to the Dividend, ſo is one to the Quotient.

Example. *How many ſquare Yards are in* 36 *ſquare Feet?* Anſwer, 4 *ſquare Yards*. For it is thus;

As 9 is 1, ſo is 36 to the Quotient 4, thus to be Wrought by the *Sector:*

As Lateral 1 is to Parallel 9, ſo is Parallel 36 to Lateral 4, the Yards required.

PROB. III. *To work the Rule of* 3 *by the Line of Lines on a* Sector: *or unto* 3 *Numbers given; to find a* 4th *in Geometrical Proportion,*

The Anology is,

AS the 1ſt Term is to the 2d Term, ſo is the 3d Term to the 4th Term requir'd.

Example 1. *If the Diameter of a Circle be* 14 *Inches*; *What's the Circumference*? Anſwer, 44 *Inches*. For the Proportion is this:

As 7 to 22, ſo is the Diameter 14 to 44, the Circumference requir'd; by *Sector* thus wrought.

As Lateral 22 to Parallel 7, ſo is Parallel 14 to Lateral 44, the Circumference of a Circle whoſe Diameter is 14.

Example 2. *If a Plank or Board be* 15 *Inches broad, and* 20 *Feet long*; *How many Feet is in it*? Anſwer, 25 *Feet*. For the Proportion is this:

As 12 to 15 the Breadth, ſo is 20 the length to 25 Feet, the Content of the Board; and by *Sector*, thus to be wrought;

As Lateral 15 to Parallel 12, ſo is Parallel 20 to Lateral 25 Feet, the Content of the Plank.

¶

Example 3. *A Ship being in* 42 *d.* 12 *m.* North *Latitude, ſhe ſails N. E. by N.* 104 *Leagues*; *I demand the Latitude ſhe is in, and her Departure from the Meridian*;

The Cannons or Proportions, are theſe;

1. As Radius to the Diſtance ſail'd, ſo is the Sine of the Courſe to the Departure from the Meridian.

That is, by the *Sector* thus;

As Lateral 104 Leagues (from the *Line of Lines*) is to Parallel Sine of 90 d. ſo is Parallel Sine of 33 d. 45 m. the Degrees of the Courſe from the Meridian to Lateral 58 Leagues (on the *Line of Lines*) the Departure from the *Meridian*.

Note, If 104 Leagues, taken Lateral, be troubleſome, to fit Parallel in Sine of 90 d. then take its half, or quarter Lateral; And the Anſwer will be accordingly its half or quarter: As here, if you take 52, the half of 104 Leagues, the Anſwer would be 29, whoſe double is 58 for the Departure from the Meridian, as before.

2. As Radius to the Diſtance ſail'd, ſo is the Sine Complement of the Courſe to the difference of Latitude.

By the Sector, *thus*;

As Lateral 104 Leagues is to Parallel Sine of 90 d. ſo is Parallel Sine of 56 d. 15 m. to Lateral 87 Leagues, the Difference of Latitude by which you may find the Latitude the Ship is in, as before in the Uſe of the *Gunter*.

Examp. 4. *A Ship ſails South Eaſterly till her Difference of Latitude be* 275 min. *and the Departure be* 412 min. *I demand her Courſe and Diſtance ſail'd.*

The Canons, are theſe;

1. As the Difference of Latitude is to the Departure, ſo is Radius to the Tangent of the Courſe.

That is, *By the* Sector *thus*;

As Lateral 412 Minutes is to Parallel 275 Minutes ſo is Parallel Tangent of 45 Degrees (that being Radius now) to Lateral Tangent of 56 Degrees, 15 Minutes, the Courſe from the Meridian, which makes S. E. by E.

2. As the Sine of the Courſe is to the Departure, ſo is the Radius to the Diſtance ſail'd.

By the Sector, *thus*;

As Lateral 412 m. to Parallel Sine 56 d. 15 m. ſo is Parallel Sine of 90 d. (that now being Radius) to Lateral 495 m. the Diſtance ſail'd.

After this manner may any Proportion be wrought by the *Sector*, which I leave for the Learner's Exerciſe.

The Uſe of the following Tables of *Latitude* and *Longitude.*

Latitude and *Longitude* are two primary Affections of the Earth: By the help of theſe two doth the *Geographer* ſtrive to repreſent the Parts of the Earth, that they may keep ſymetry and harmony with the Whole.

Latitude is an Arch of the Meridian, comprehended between the Equinoctial and a Parallel. But *Longitude* is an Arch of the Equinoctial, intercepted by the Meridian of *London*, and the Meridian of any other Place.

For the exact ſettling of Latitudes, we have many abſolute Helps; but the Longitude of a Meridian is that which hath, and ſtill wearieth the greateſt Maſters of *Geography*.

I have endeavoured to ſettle the Longitude with as much exactneſs as poſſible I could: For I not only calculated according to the Lat. and Merid. Diſtance of each Place from the Meridan of *London*; which Meridian-Diſtance I obtained from the exacteſt *Geographial Charts* extant; but I conſulted with the Reckonings of ſkilful and able Mariners; and when I found any difference, I compoſed it both according to Art and Reaſon.

As for inſtance; I had from ſkilful and able Mariners, upon their long experience, the Meridian-Diſtance from *Barbadoes* to the *Lizard*: According to which I have ſettled the Longitude of all the eminent Places in the *Weſt-Indies*.

And for the ſettling of the Longitudes of the Plaçes in *Eaſt-Indies*, I conſulted Obſervations of Eclipſes both Antient and Modern, as in 161 Page of *Hermonicon cæleſte*, the difference of Meridians between *Goa* and *London*, is 5 h. 48 m. and *Malico* and *London*, is 7m. 19m. My Table hath the former of theſe 6h. 6m. and the latter 7h 23m. the Differecc between my Table, and the former of theſe Obſervations is 18 m. and of the latter is 4 m. which Difference may be born withal.

“ If the Reader conſiders the Time, being 1664,
“ with the great Labour and Pains, to my Knowledge,
“ being then his Servant, the Author beſtow'd and ex-
“ pended in performing this Work, they were then the
“ beſt of this Kind.

“ But ſince that Time there hath been better Helps,
“ new Diſcoveries made, and new Places found out; the
“ *Corrector*, at the Requeſt of the *Bookſeller*, and out of
“ Reſpect to the deceaſed *Author*, but moſt of all for the
“ *Publick Good*, hath made ſuch Amendments herein, as
“ was poſſible, by comparing the beſt of *Obſervations*,
“ *Tables*, *Charts*, *Maps*, and *Sea-Journals*, he was able to
“ procure; ſo that it may be concluded, theſe *Tables*
“ are the *trueſt*, or come (in the general) the neareſt the
“ *Truth*, of any extant in our Language; not that they
“ are ſo exact in every particular Place, as to need no
“ Amendment in Time, but with reſpect to the preſent
“ Helps in 1707, they are ſo.

“ And now I could wiſh, that either *Authority* would
“ order, or that all concern'd in ſetting forth *Latitude*
“ and *Longitude Tables*, *Charts* and *Maps*, would mutually
“ unite in a *Fixed-Meridian* to begin *Longitude* at.

“ For although *Longitude* may begin at any *Meridian*,
“ yet the Convenience of its beginning at one *Meridian*,
“ in all our *Engliſh Navigation-Books*, *Charts*, would ren-
“ der the *Study* and *Practice* of *Navigation* much more
“ pleaſant and eaſy, than now it is: Such various begin-
“ nings and countings of *Longitudes*, occaſioneth ſome to
“ *Stumble*, ſome to *Miſtake*, and ſome to *condemn* all to
“ be falſe, by not conſidering the ſeveral *Meridians* made
“ uſe of; which ſuch a wiſh'd Union would prevent.

“ But this is not likely to be in my Time, who am ſo
“ near the *Grave*; yet ſhould it be ſet on foot, while I
“ am on this ſide the other World, my beſt Perform-
“ ances ſhould not be wanting to promote it, and ſhould
“ count all my ſpare Hours from neceſſary Preparations
“ for my *Laſt-End*, well ſpent in ſuch a *Uſeful*, and
“ *Publick Good*.

Note, 1. I do begin the *Longitude* at the Meridian of *London*, and increaſing it on both Sides the ſaid Meridian; that is to ſay, both *Eaſtward* and *Weſtward*, and terminate at 180 Degrees.

2. Therefore (according to this Account) all Places on the Eaſt-ſide of the Meridian of *London*, lie in Eaſt Longitude; and on the contrary, all on the Weſt-ſide of it, lie in Weſt Longitude.

3. If a Ship be in Eaſt Longitude, ſailing to the Eaſtward, the Longitude increaſeth; but ſailing to the Weſt-ward, the Longitude decreaſeth.

4. And on the contrary, if a Ship be in Weſt Longitude, then ſailing to the Weſtward, the Longitude increaſeth, and ſailing to the Eaſtward, it decreaſeth.

5. Take notice, that two Places in the Eaſt Longitude, the Sun cometh on their Meridian before he cometh on the Meridian of *London*. As, if a Place lie in 15 deg. Eaſt Longitude, the Sun cometh one Hour, ſooner to the Meridian there, than he doth to the Meridian of *London*. If in 30 deg. Eaſt Longitude, then 2 Hours ſooner, if 45d. three Hours ſooner, if 60 d. four Hours ſooner, if 75 d. five Hours ſooner, if 90 d. ſix Hours ſooner, if 105 d. ſeven Hours ſooner; and ſo you may reckon for any other Longitude. But on the contrary, all thoſe Places that lie in *Weſt* Longitude, the Sun or Star cometh on their Meridian after he is paſt the Meridian of *London*.

To find the Difference of Longitude *between any two Places.*

IF both Places be in Eaſt or in Weſt *Longitude*, ſubtract the leſſer *Longitude* out of the greater, and the Remainder is the Difference of *Longitude*.

If one Place be in Eaſt *Longitude*, and the other in Weſt, add both together, and their Sum is the Difference of *Longitude*.

A TABLE *containing the Chief Harbours, Headlands and Iſlands in the World; ſhewing their Latitude and Longitude: Beginning the ſaid Longitude at the Meridian of* London.

The Sea-Coaſt of *Greenland*.

Names of Places.	Latitude.		Longitude	
	D.	M.	D.	M.
HAcluits Headland	79	50	12	10
Fair Foreland	79	15	11	05
Cape Cold, the North end of *Charles Iſle*	79	00	10	32
Black Ponit, South end of it	78	30	12	40
Dear Sound	79	15	13	00
Foul Sound	77	38	13	20
Bell Sound	77	34	13	39
Horn Sound	77	17	14	30
Point Lookout	76	35	16	10
Helies Sound	79	17	22	20
Cape Barcam	78	25	23	32
Cape Blanco	78	00	23	30
Ducks Cove *Edges Iſland*	77	45	23	10
Negro Point *Edges Iſland*	77	10	23	30
Hope Iſland	76	25	26	12
Cherry Iſland, or *Bear Iſland*	74	40	18	18
Ice Point, or *Cape Deſire*	77	40	69	10
Admiralties Iſland	75	10	60	00
Langeneſs	74	35	56	00
Croſs Point	72	25	56	12
Fretum Burrough	70	00	66	20
Mauritius Iſle	69	35	57	00
Cape Candenoſe	69	25	41	15
Cape Barſo	66	00	38	25

North Latitude.

East Longitude.

Sea-Coaſts from *Archangel* to the *Naze* of *Norway*.

Names of places.	Latitude. D.	M.	Longitude. D.	M.
Archangel	64	25	34	58
Cape Grace, or *Cape Bona Fortuna*	65	37	37	30
Cape Gallant, or *Sweetnoſe*	67	41	36	00
Kilduyn Iſland	69	10	32	00
River Kola	69	15	31	50
Schurtinberg Neſs	71	10	24	38
North Cape	71	25	22	42
Landen	71	08	18	08
Iſland Sanien	69	30	13	15
Warro, or *Weroy*	67	00	07	28
Drenton	64	01	08	06
Ranſdel	63	20	06	52
North Point	62	30	03	45
Katts Neſs, or *Scutts Neſs South-point*	61	54	03	22
Harla Iſland, the *South end*	60	14	03	38
Bergen	60	10	04	20
Bommel Sound	59	30	03	40
Out Seers	58	45	03	16
Jedder	58	27	04	40
Naze of Norway	58	00	06	02

North Latitude.

East Longitude.

Sea-

Sea-Coaſts in the *Sound.*

Names of Places.	Latitude. D.	Latitude. M.	Longitude D.	Longitude M.
Maerden	58	17	07	58
Long Sound	58	37	08	00
Layerwick	58	40	08	44
Coperwick	59	10	08	50
Anſloo or *Chriſtiana*	59	10	09	10
Gotenberg Gat	57	36	12	18
Cape Kol	56	10	12	42
Elſenberg	56	16	12	50
Valſterbore	55	22	13	05
Chriſtianopoli	58	30	14	35
Kalmore	56	45	14	54
Oeland the South-End	56	20	14	59
North-End	57	20	15	30
Stickholm	57	33	14	35
Stockholm	59	00	17	02
Aboo	60	38	19	59
Raſheburg	60	49	21	28
Borgo	60	52	26	10
Pelling Sound	60	30	27	10
Vekelax	60	46	28	18
Wyburgh	61	00	29	26
Caſt Rand, or *Caſtrum*	60	02	29	47
Narva	59	35	28	50
Revel	59	28	25	18
Nargin Iſland	59	50	24	35
Sybrichneſs of *Dageroort*	59	34	23	11
Arensburg in *Oeſel Iſland*	58	45	23	42
Parnout	58	22	27	30
Rugen Iſland	58	00	24	00
Ryga	57	10	24	50
Domeſneſs	58	00	23	00

North Laitiude.

East Longitude.

Sea Coaſts in the *Sound.*

Names of Places.	Latitude. D.	M. North Latitude.	Longitude D.	M. East Longitude.
Der-Winda	57	08	22	43
Der-Memel	56	15	21	20
Coningsberg	55	05	20	32
Dantzick	54	30	19	05
Heel	55	00	18	35
Gotland, the North End	58	00	19	09
Faro Sound.				
Gotland Wisby	57	28	19	00
Gotland, the South end	57	03	18	00
Born Holm	55	28	15	06
Camin, or *Kamin*	54	25	15	06
Jaſmond, or *Rugen*	55	00	13	40
Stetin	54	15	15	40
Straelſond	54	30	12	50
Waſmor	54	15	12	00
Lubeck	54	10	10	06
Copenhagen	55	40	12	24
Elſenore	56	15	12	17
Anout Iſland	56	45	10	54
Leſon, or *Leſnow Iſland*	57	05	10	19
The *Scaw*	57	26	10	00

The Sea-Coaſts of *Holland* and *Flanders*, from the *Scaw* to *Calis.*

		North Latitude.		Eaſt Longitude.
Holy Land, or *Heligland Iſle*	54	30	08	00
Hambrough	54	00	10	00
Bremen	53	50	09	12
Emden	53	34	08	00
Ameyland	53	40	06	40
Schelling	53	25	05	50
The *Fly*	53	15	05	28

The Sea Coaſts of *Holland* and *Flanders*, from the *Schaw* to *Calis*.

Names of Places.	Latitude.		Longitude	
	D	M.	D.	M.
The *Texel*	53	10	05	12
Amſterdam	52	30	05	00
Roterdam	51	55	04	20
Antwerp	51	17	04	32
The *Brill*	52	00	04	14
Middleburg in *Zealand*	51	48	04	00
Sluys	51	28	03	57
Oſtend	51	30	03	05
Dunkirk	51	18	02	25
Calis	51	00	01	52

North Latitud.

Eaſt Longitude

The Sea Coaſts about the Iſland of *Iſeland*.

Grimes Hole, or *Geubermans Rocks.*	66	23	20	10
Gamatt Iſles, or *Gille*	65	48	27	30
Weſtmania Iſles	63	37	23	17
Rook Point	64	00	26	03
Snow Hill	65	11	27	14
Fair Foreland	65	40	26	17
Rage Point, or *Orgal Bay*	66	30	25	14
Marza, or *Largerneſs*	66	08	24	00
Grimſa Iſle	67	22	22	44
Lange-Neſs	66	56	13	00
Bargafer Point, or *Helles*	66	07	12	35
Silly, or *Papey Iſle*	64	50	12	10
Horn Bay	64	42	12	10
Merchants Foreland	63	52	19	06
Portland	64	02	21	05

North Latitude.

Weſt Longitude.

The Sea Coaſts of *Scotland.*

Names of Places.	Latitude.			Longitude		
	D.	M.		D.	M.	
Sky Iſland North End	57	40	North Latitude.	05	21	Weſt Longitude.
Iſland Lewes North End	58	20		07	02	
Farro Head	58	23		05	05	
Shetland South End	60	02		03	00	
Fair Iſle	59	30		03	20	
Iſles of Orkney	59	10		03	32	
Cath Neſs	58	47		02	06	
Buchan-Neſs	57	55		00	58	
Aberdeen	57	12		01	55	
Dondee	56	26		02	47	
Leith	56	00		02	55	
Berwick	55	50		01	39	

The Coaſt of England, from *Berwick* to the *Lizard.*

Names of Places.	Latitude D.	Latitude M.		Longitude D.	Longitude M.	
Newcaſtle	54	58	North Latitude.	01	30	Weſt Longitu.
Shelds	55	02		01	20	
Sunderland	54	52		01	20	
Hartlepool	54	40		00	55	
Whitby	54	35		00	40	
Scarborough	54	20		00	03	
Flamborough Head	54	08		00	11	E. Lon.
Burlington	54	00		00	06	
The *Spurn*	53	35		00	36	
Hull	53	45		00	28 wL	
Grimesby	53	39		00	56	Eaſt Longitude
Boſton	53	09		00	10	
Linn	52	56		00	29	
Wells	53	07		01	00	
Blackney	52	24		00	55	
Cromer	53	10		01	07	

The Coaſts of *England*, from *Berwick* to the *Lizard.*

Names of places.	Latitude. D.	Latitude. M.		Longitude D.	Longitude M.	
Winterton	53	02	North Latitude.	01	22	East Longitude.
Yarmouth	52	45		01	38	
Alborough	52	24		01	25	
Orfordneſs	52	20		01	11	
Ipſwich	52	14		01	00	
Harwich	52	11		01	18	
Colcheſter	52	04		00	58	
London	51	32		00	00	
Rocheſter	51	28		00	25	
Marget	51	29		01	10	
The North Foreland	51	28		01	10	
Sandwich	51	27		01	09	
The Downs	51	25		01	21	
The South Foreland	51	12		01	20	
Ripraps	51	53		01	25	
Dover	51	15		01	18	
Dongeneſs	51	00		00	51	
Rye	51	03		00	45	
Beachy	50	48		00	19	
Shoram	50	55		00	17	
Portſmouth	50	48		01	00	West Longitude.
Iſle of Wight	50	58		01	06	
Pool	51	00		01	50	
Weymouth	50	43		02	40	
Portland	50	30		02	48	
Chiddock	50	47		03	00	
Lime	50	45		03	14	
Topſham	50	37		03	27	
The Bery	50	25		03	49	
Torbay	50	32		03	38	
Dartmouth	50	27		03	36	
The Start-point	50	07		03	45	

The Sea-Coaſts of *England*.

Names of places.	Latitude. D.	Latitude. M.	Longitude D.	Longitude M.
The Eddyſtone	50	12	04	20
Plymouth	50	36	04	13
Rambead	50	14	04	35
Foy	50	25	04	30
Falmouth	50	12	05	12
Lizard	50	00	05	24

North Latitude

W Longitude.

The Sea-Coaſts from the *Lizard* to *Holy Head*.

Names of places.	Latitude. D.	Latitude. M.	Longitude D.	Longitude M.
Lands End	50	06	05	58
Gulf	50	00	06	06
Scilly Iſlands, the middle	50	00	06	45
Seven Stones	50	10	06	40
Hartland Point	51	06	04	35
Londey Iſle	51	20	04	40
Mort Bay	51	12	04	40
Briſtol	51	32	02	40
Swanſey	51	40	04	25
Caldy Iſland	51	33	05	14
Milford	51	45	05	15
St. *David's* Head	52	00	05	22
Barſey-Iſle	52	43	05	10
Leverpoole	53	20	03	10
Weſtcheſter	53	37	04	20
Lancaſter	54	40	03	35
White Haven	54	10	03	50
Iſle of Man, Weſt-end	53	45	05	00
Holy Head	53	24	05	00

North Latitude.

Weſt Longitude.

The

Sea-Coaſts of *Ireland.*

Names of Places.	Latitude.		Longitude	
	D.	M.	D.	M.
Fair Foreland	55	05	06	30
London Derry	54	55	08	00
Iſland Torre	55	08	08	30
Iſles of Arran	54	48	08	59
Stags of Broad Haven	54	07	10	05
Iſles of Arian	54	55	09	50
Galloway	53	05	09	20
Gally, or *Doen's Head*	52	40	09	13
Lupis's Head	52	24	10	15
Limrick	52	24	09	20
Blaſques	52	00	11	55
Skillocks	51	30	11	55
Cow and Calf	51	22	10	36
Mizan Head	51	15	11	30
Old Head of Kinſale	51	35	08	58
Cape Clear	51	10	10	30
Kinſale	51	50	09	40
Cork	51	50	09	30
Waterford	52	10	08	28
Wexford	52	13	07	38
Dublin	53	22	07	30
Lambay	53	24	07	30

North Latitude.

Weſt Longitude.

Sea-Coaſts of *France.*

Names of Places.	Latitude.		Longitude	
	D.	M.	D.	M.
alis	51	00	01	50
Diep	50	00	01	00
St. *Valery*	50	10	00	56
Sain Head, or *Cape de Antifer*	49	44	00	24
Roven Mouth	49	36	00	30
Cape Berfleur	49	47	01	12
Cape de la Hague	49	50	02	00

North Latitude.

Eaſt Long.

W.L.

Sea Coaſts of *France*:

Names of places.	Latitude. D.	M.	Longitud D.	M.
Alderney	49	50	01	47
Caskets	49	50	02	05
Guernſey	49	36	02	35
Jerſey	49	20	02	19
St. *Maloes*	48	35	01	05
Morlaix	48	34	03	49
Iſland de Baſs	49	00	04	00
Uſhant	48	30	05	19
Conquet	48	25	05	05
Breſt	48	25	04	45
Camarita Bay	48	25	04	28
Seams	48	04	05	01
Weſt Penmarks	47	45	04	24
Bell-Iſle	47	09	03	20
Nants	47	15	01	49
Heys-Iſle	46	24	02	14
Iſle de Rey	46	00	01	30
Oleron	46	00	00	34
Rochel	46	10	00	30
Bourdeaux City	45	10	00	30
St. *Sebaſtian*	43	30	01	25
Bilboa	43	35	02	54
Cape Pinas	44	44	06	00
Cape Ortegal	44	00	07	30
Cape Coruna or *Groin*	43	28	09	20
Cape Finiſterre	43	10	10	30
Iſles of Bajona	42	22	09	24
Burlings	39	43	10	52
Rock of Lisbon	39	00	10	18
Lisbon	39	08	10	20
Cape St. *Vincent*	37	00	10	35
Cape St. *Maria*	36	58	09	18
Cadis	36	18	07	00

North Latitude.

eſt Longitude.

The Coaſts on the Main-Continent within the *Straits.*

Names of Places.	Latitude. D.	Latitude. M.		Longitude D.	Longitude M.	
Gibralter	36	10		07	00	W. Long.
Malaga	36	50		03	17	
Cape de Gat	36	47		01	15	
Cape Paul	37	38		00	17	
Alicant	38	30		00	35	
Cape Martin	38	46		00	56	
Barcelona	41	20		02	05	
Marſeilles	43	12		05	20	
Toulon	43	05		05	40	
Genoa	44	25		09	10	
Leghorn	43	28		11	39	
Civita Vechia	41	46		12	00	
Rome	41	58	North Latitude.	13	05	Eaſt Longitude.
Naples	41	08		15	47	
Cape Spartevento	38	00		16	52	
Cape Colonne	39	10		18	06	
Gallipoli	40	08		20	00	
Cape St. *Maria*	39	52		19	29	
Ancona	43	35		15	00	
Venetia	45	17		12	35	
Zara	44	05		17	15	
Stanio	42	57		22	47	
Raguſa	42	39		20	00	
Catcaro	42	31		20	05	
Antavara	41	49		25	30	
La Valona	40	57		21	24	
Point Palermo	40	05		21	40	
Lepanto	38	20		22	30	
Cape Matapan	36	28		22	49	
Cape St. *Angelo*	37	00		24	28	
Athens	38	00		25	23	

The Coaſts on the Main Continent within the *Straits*.

Names of Places.	Latitude. D.	Latitude. M.	Longitude D.	Longitude M.
Cape Martelo South Point of Negropont.	38	05	27	50
Cape Colonia	37	30	25	25
Cape Monte Sancto	40	00	26	59
Gallipoli	40	20	29	05
Conſtantinople	41	06	31	50
Cape Barbora	39	00	28	21
Smyrna	38	26	28	30
Cape Babernola	38	05	27	30
Epheſus	37	35	28	17
Antiochetta	36	30	35	25
Scanderoon	36	25	39	40
Forcoſa	35	18	39	35
Antiocha	35	54	39	20
Tripoli	34	30	39	10
Joppa or *Jaffa*	32	32	37	15
Cairo	30	05	34	20
Alexandria	31	05	33	04
Cape Ruſato	33	28	24	12
Cape Miſorato	33	18	19	56
Tripoli	32	55	13	17
Suſpa	36	00	10	43
Cape Bona	37	05	10	47
Tunis	36	50	10	00
Bona	37	09	07	00
Gigeria	37	03	05	12
Cape Tedelles	37	08	04	00
Algier	36	40	03	30
Cape Tenos	36	30	02	34
Oran	35	46	01	05
Cape Trees Forcas	35	37	01	36
Ceuta	35	37	03	11
Tangier	35	36	04	19

North Laitiude.

East Longitude.

W. L.

Iſlands within the *Straights.*

Names of Places.	Latitude.		Longitude	
	D.	M.	D.	M.
Formentara	38	44	03	30
Ivica	39	05	03	33
Majorca	39	38	04	18
Minorca	39	55	05	32
South end of of Sardinia	38	46	09	10
North end of Sardinia	41	00	10	01
Aſinara	41	00	09	50
South end of Corſica	41	20	10	17
North end of Corſica	42	55	10	28
Capraia	42	58	10	57
Lilbo, or *Elba*	42	31	11	12
Planoſa	42	07	11	09
M. Chriſto	41	55	11	27
Palmarolla	40	50	12	55
Ponſa	40	40	15	00
Iſcia, or *Eſchia*	40	46	16	12
Strombello	39	00	16	38
Volcanello	38	48	16	06
Fellicur	38	43	15	37
Allicur	38	45	16	13
Uſtica	38	50	15	34
Weſt end of Sicilia	37	52	14	43
Middle of Sicilia	37	42	16	45
Eaſt end of Sicilia	37	07	18	00
Meſſina	38	07	16	57
Siracuſa	37	10	16	55
Pantalaria	36	53	14	00
Limoſſa	36	20	14	41
Lampidoſa	35	58	14	05
Sematto	35	46	14	15
Cape Paſſaro	36	45	16	57
Malta	36	00	16	00
Grande	44	00	15	22

North Latitude.

Eaſt Longitude.

Iſlands within the *Straights*.

Names of places:	Latitude. D.	Latitude. M.		Longitude D.	Longitude M.	
Poma	43	14	North Latitude.	16	00	Eaſt Longitude.
St. *Androa*	43	07		16	04	
Liſſa	43	00		16	09	
Auguſta	42	56		16	39	
Corzola	42	53		16	14	
Melada	42	37		17	39	
Corfu	39	45		20	42	
Cephalonia	38	15		21	49	
Zant	37	47		22	14	
Sapienza	36	47		22	52	
Iſlands in the *Archipelago*.						
Taſſo	40	00	North Latitude.	27	55	Weſt Longitude.
Lemnos	39	41		28	25	
Metelin	38	54		29	18	
Metelino	38	28		28	57	
Siatto	39	00		26	45	
Tino	37	25		27	49	
Sia, *Sea*, or *Sira*	37	18		27	37	
Femenia, or *Fermina*	37	28		27	54	
Serfanto, or *Sifanto*	36	58		27	15	
Millo, or *Milo*, or *Mela*	36	40		27	15	
Weſt-end of Candia	35	15		25	01	
Eaſt-end of. Candia	35	24		28	38	
Rhodes	36	40		29	38	
Weſt-end of Cyprus	34	22		33	23	
Weſt-end of Cyprus	34	48		36	14	
The Sea-Coaſts of *Barbary* and *Guiney*, from *Tangier*, to *Cape Bon Eſperance*.						
Cape Sparcel	35	30	N. Lat.	04	35	W. Long.
Salle	33	45		04	55	
Cape Cantin	32	17		09	00	
Cape de Geer	30	10		10	50	